# U.S. DEPARTMENT OF THE INTERIOR

# FISH AND WILDLIFE SERVICE

# DRAFT ENVIRONMENTAL ASSESSMENT

# for

# The 2014 Hunt Plan for Patoka River National Wildlife Refuge and Management Area

**Regional Director**
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**Abstract**:

The United States Fish and Wildlife Service (Service) proposes to provide compatible hunting opportunities for migratory game bird, upland game, and big game species on units of the Patoka River National Wildlife Refuge & Management Area located within Pike and Gibson Counties in Southwest Indiana. This environmental assessment evaluates three possible alternatives for the hunting opportunities. The proposed action alternative will establish compatible hunting opportunities while providing non-hunting visitors with other priority public use opportunities (i.e. wildlife observation, wildlife photography, environmental education and interpretation) on lands described in the 2014 Hunt Plan. The approved acquisition boundary includes conservation easements, which will stay in private ownership and be managed by the U.S. Fish and Wildlife Service, and lands purchased in fee title. The proposed hunting opportunities will involve both conservation easements and fee title land. The general broad objectives of the hunting program are:

-Provide the public with safe and enjoyable hunts that are compatible with the Refuge purpose.

-Provide quality hunting opportunities that minimize conflict with other public use activities.

-Provide the public with opportunities to hunt migratory game birds, upland game and big game species that are consistent with the states of Indiana, that don't adversely affect localized wildlife populations, and are consistent with the 1997 National Wildlife Refuge Improvement Act.

-Promote a better understanding and appreciation of Refuge habitats and their associated fish and wildlife resources.

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# Contents

# CHAPTER 1. PURPOSE AND NEED FOR ACTION

## SECTION 1.1 Purpose

This Environmental Assessment (EA) is an update to the EA for Opening Portions of Patoka River National Wildlife Refuge and Management Area (Refuge) for Hunting and Fishing as Proposed in the 1996 Hunting and Fishing Plan. This EA is a step down plan of the Final Environmental Impact Statement for the establishment of the Patoka River National Wetlands Project (EIS) which was used to fulfill NEPA compliance to open the Patoka River National Wildlife Refuge and Management Area National to hunting.

The Purpose of this Environmental Assessment is to evaluate alternatives for opening and administering a hunting program on the fee title and easement lands described in the 2014 Hunt Plan.

## SECTION 1.2 Need

Providing compatible wildlife-dependent recreation and education activities on units of the National Wildlife Refuge System is a Service priority. The National Wildlife Refuge System Administration Act of 1966 (Act) as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd et seq.) provides authority for the Service to manage the Refuge and its wildlife populations. In addition, it declares that compatible wildlife-dependent public uses are legitimate and appropriate uses of the Refuge System that are to receive priority consideration in planning and management. There are six wildlife-dependent public uses: hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation. The Act directs managers to facilitate recreational opportunities, including hunting, on National Wildlife Refuges when compatible with the purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

Hunting on Patoka River National Wildlife Refuge and Management Area will allow Refuge staff to manage wildlife populations at acceptable levels, provide wildlife-dependent recreational opportunities for the public, and promote a better understanding and appreciation of bottomland hardwood forest habitats and their associated fish and wildlife resources. Implementation of the proposed actions will be consistent and compatible with the Refuge Recreation Act, Refuge Administration Act, and the EIS for the establishment of the Patoka River National Wetlands Project.

## SECTION 1.3 Decisions That Need To Be Made

This EA is prepared to evaluate the environmental consequences of opening newly acquired fee title and easement lands described in the 2014 Hunt Plan to hunting and the types of hunting that will be allowed. Three alternatives are presented in this document:

A. All recently acquired lands described in the 2014 Hunt Plan (1,334 acres) would remain closed to hunting, Public use on 7,110 acres acquired prior to 2013-2014 will remain unchanged. (No Action Alternative)

B. As described in the 2014 Hunt Plan, allow the hunting of migratory game birds, upland game, and big game species on recently acquired fee title lands (291 acres) and selected hunting on the Columbia Mine Conservation Easement (1,043 acres) in accordance with federal regulations, Refuge-specific regulations, the Columbia Mine Public Use Plan, and the laws of the State of Indiana. Public use on 7,110 acres acquired prior to 2013-2014 will remain unchanged. (Preferred Alternative)

C. Allow the hunting of migratory game birds, upland game, and big game species on recently acquired fee title lands (291 acres) in accordance with federal regulations, Refuge-specific regulations, and the laws of the State of Indiana; while the Columbia Mine Conservation Easement (1,043 acres) would remain closed to hunting. Public use on 7,110 acres acquired prior to 2013-2014 will remain unchanged.

The Regional Director, U. S. Fish and Wildlife Service, Twin Cities, Minnesota, is the official responsible for determining the action to be taken in the proposal by choosing an alternative. The Regional Director will also determine whether this Environmental Assessment (EA) is adequate to support a Finding of No Significant Impact (FONSI) decision, or whether there is a significant impact on the quality of the human environment, thus requiring the preparation of an Environmental Impact Statement (EIS).

## SECTION 1.4 Background

The Patoka River National Wetlands Project encompasses 22, 472 acres in Gibson and Pike counties in southwestern Indiana (see Figure 1). Lands purchased as conservation easements or in fee title are administered by the US Fish and Wildlife Service (Service) and become units of the Patoka River National Wildlife Refuge and Management Area (Refuge) under the authority of the Fish and Wildlife Act of 1956 "… for the development, advancement, management, conservation, and protection of fish and wildlife resources…" [16 U.S.C. 742f(a)(4)] "…for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude…" [16 U.S.C. 742f(b)(1).]

Patoka River NWR & MA was established in 1994. It was created under authority of the Emergency Wetlands Resources Act in part to protect one of two remaining intact floodplain forest systems within Indiana. The authorized boundary, which delineates where the Service can acquire property from willing sellers, encompasses 22,472 acres of wetlands, floodplain forest, grasslands, shrublands, and upland forest along 20 miles of the Patoka River corridor. Management objectives are identical for the National Wildlife Refuge (NWR), authorized at 7,005.5 acres, and the Management Area (MA), authorized for the remaining 15,466.5 acres. The separate designations avoid legal conflicts with the Surface Mining Control and Reclamation Act (SMCRA) of 1977. It has no implications for the management of these areas.

The staff of Patoka River NWR & MA administers three units in addition to the main body of the Refuge. The Cane Ridge Wildlife Management Area (488 acres, fee title, closed to all public access except non-consumptive uses in designated areas), White River Bottoms Unit (219 acres, fee title), and Columbia Mine (1,043 acres, conservation easement) are all considered part of the National Wildlife Refuge.

The Refuge provides hunting opportunities for game species such as: waterfowl, cottontail rabbit, gray and fox squirrel, mourning dove, white-tailed deer, and wild turkey.

The purposes for which the Refuge was established, as contained in the EIS and approved in the Record of Decision in 1994, include:

1. To restore, protect, and manage a bottomland hardwood forest for the many values associated with wetlands

2. To restore, protect, and manage uplands that compliment and/or protect wetlands

3. To restore, protect, and manage migratory bird habitat

4. To restore, protect, and manage habitat for endangered and threatened species of plants and animals

5. To increase public opportunities for outdoor recreation and environmental education

6. To provide wildlife extension services and restore habitat in southwestern Indiana according to guidelines of the Service's Partners for Fish and Wildlife Program

7. To improve water quality in the Patoka River watershed to reduce adverse impacts on human health and wildlife productivity, enhance the fishery resource, and increase the attractiveness of the water resources for wildlife-oriented public recreation

Specific objectives of the hunting program include:

1. Provide the public with safe and enjoyable hunts that are compatible with the Refuge purpose.

2. Provide quality hunting opportunities that minimize conflict with other public use activities.

3. Provide the public with opportunities to hunt migratory game birds, upland game and big

game species that are consistent with the state of Indiana, that don't adversely affect localized wildlife populations, and are consistent with the 1997 National Wildlife Refuge Improvement Act.

4. Promote a better understanding and appreciation of Refuge habitats and their associated fish and wildlife resources.

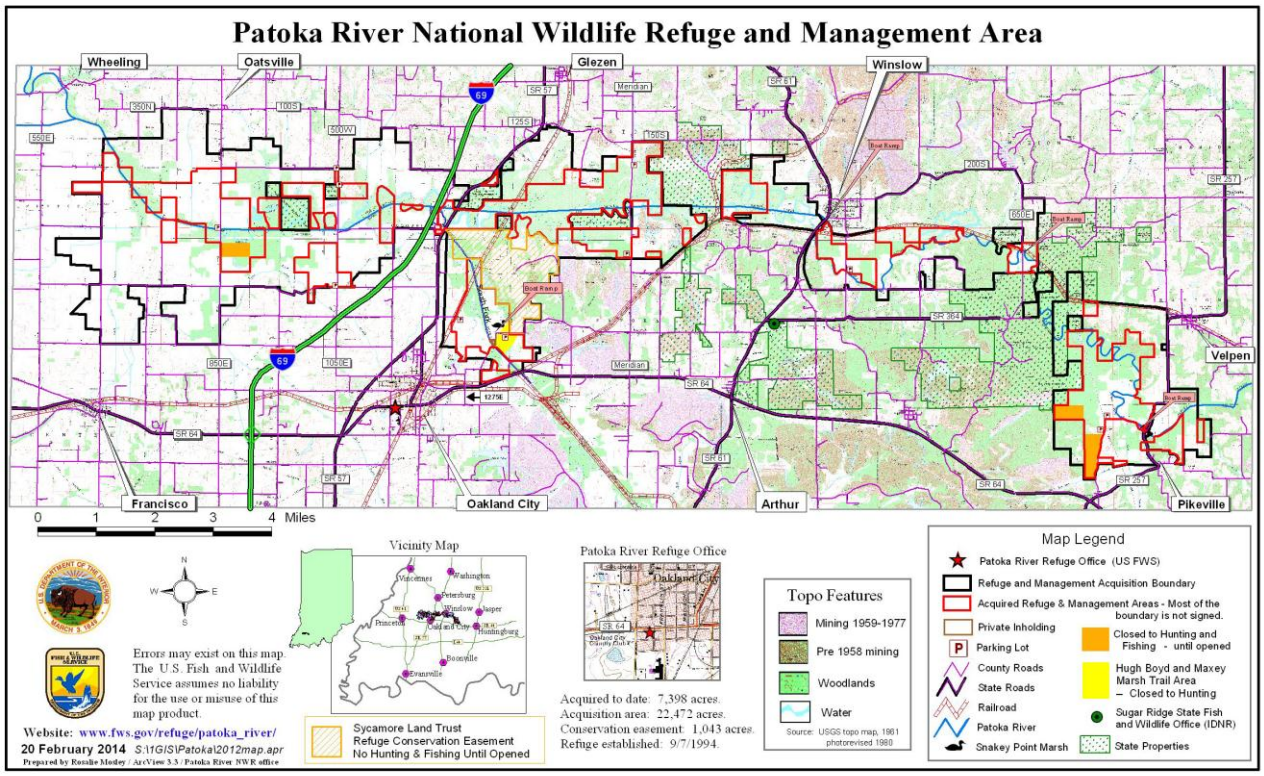


**Figure 1.** Patoka River National Wildlife Refuge and Management Area, Southwestern Indiana

# CHAPTER 2. PROPOSED ACTION AND THE ALTERNATIVES

## SECTION 2.1 Alternatives Eliminated From Detailed Study

No alternative was eliminated from detailed study.

## SECTION 2.2 Alternatives Carried Forward for Detailed Analysis

This Environmental Assessment is prepared to evaluate the environmental consequences of opening fee title and conservation easement lands within the Refuge to hunting. Three alternatives are presented in this document:

### 2.2.1 Alternative A: All recently acquired lands described in the 2014 Hunt Plan (1,334 acres) would remain closed to hunting, public use on 7,110 acres acquired prior to 2013-2014 will remain unchanged. (No Action Alternative)

Under this alternative, 1,334 acres of recently acquired Refuge land (fee title and conservation easement) would continue to serve as habitat for wildlife and provide for five of the compatible wildlife dependent public uses – fishing, wildlife observation, photography, environmental education, and interpretation. Some populations, such as white-tailed deer, would continue to grow and possibly increase to levels that result in damage to agricultural croplands as well as to native vegetation without the population control provided by hunting. The potential for depredation complaints from local landowners and farmers would increase. Under this alternative, the public would also not be able to participate in one of the compatible wildlife-dependent public uses on these recently acquired lands.

Public use opportunities on 7,110 acres acquired prior to 2013-2014 would not change and continue be managed as described in previous plans.

Under the No Action alternative, the Service would continue to purchase conservation easements and fee title properties. Planning, managing, and implementing habitat restoration activities would continue to enhance these Refuge lands for wildlife. These actions would be carried out in cooperation with volunteers and partners.

### 2.2.2 Alternative B: As described in the 2014 Hunt Plan, allow the hunting of migratory game birds, upland game, and big game species on recently acquired fee title lands (291 acres) and selected hunting on the Columbia Mine Conservation Easement (1,043 acres) in accordance with federal regulations, Refuge-specific regulations, the Columbia Mine Public Use Plan, and the laws of the State of Indiana. Public use on 7,110 acres acquired prior to 2013-2014 will remain unchanged. (Preferred Alternative)

This alternative would allow hunting on recently acquired tracts (fee title and conservation easement) described in the 2014 Hunt Plan within the Refuge in accordance with federal regulations, Refuge specific regulations, the Columbia Mine Public Use Plan, and the seasons and regulations set by the State of Indiana, after the following determinations are made for each unit:

1) The unit is large enough to support the anticipated quantity, frequency, and duration of hunting use;

2) Public access to the unit does not require travel across private lands or closed government lands;

3) Sites are available for hunting users to park their vehicles legally and in a manner that will not adversely affect the habitat in the unit or existing public travel routes;

4) Public hunting will not have adverse effects on any federally listed or proposed species of concern; and

5) Hunting can be conducted without jeopardizing public safety.

The Refuge Manager may establish specific regulations for an individual unit to ensure the above requirements are met. Certain units or portions of units may remain closed or be periodically closed to hunting if the Refuge Manager determines that there are specific habitat, wildlife protection, and/or public safety needs that require establishing sanctuary areas. Hunting would be conducted in accordance with all applicable state, Refuge, and federal regulations. Coordination with Indiana DNR biologists will promote continuity and understanding of Service and state resource goals and objectives, and will help assure that the decision-making process takes into account all interests.

### 2.2.3 Alternative C: Allow the hunting of migratory game birds, upland game, and big game species on recently acquired fee title lands (291 acres) in accordance with federal regulations, Refuge-specific regulations, and the laws of the State of Indiana; while the Columbia Mine Conservation Easement (1,043 acres) would remain closed to hunting. Public use on 7,110 acres acquired prior to 2013-2014 will remain unchanged.

This alternative would allow hunting on recently acquired properties as described in the 2014 Hunt Plan in accordance with the federal regulations, Refuge-specific regulations, and the laws of the State of Indiana, while the Columbia Mine would be closed to hunting.

The Columbia Mine Conservation Easement would continue to serve as habitat for wildlife and provide for five of the compatible wildlife dependent public uses – fishing, wildlife observation, photography, environmental education, and interpretation. Some populations, such as white-tailed deer, would continue to grow and possibly increase to levels that result in damage to agricultural croplands as well as to native vegetation without the population control provided by hunting. The potential for depredation complaints from local landowners and farmers would increase. Under this alternative, the public would also not be able to participate in one of the compatible wildlife-dependent public uses on these recently acquired lands.

## SECTION 2.3 Alternatives Action Table

Table 1 below summarizes the actions that are anticipated under each alternative and how they affect recently acquired lands. Detailed discussion of the environmental impacts of each alternative can be found in Section 4. Some of the issues carried into the impact assessment are described in more detail in Section 4.

**Table 1: Alternative Action Table**

| Action | Alternative A (No Action Alternative) | Alternative B (Preferred Alternative) Allow Hunting Recently Acquired Lands | Alternative C Allow Hunting on Recently Acquired Refuge, No Hunting at Col. Mine |
|---|---|---|---|
| Species that will be hunted | None on recently acquired lands | On Refuge fee title: Ducks, geese, coots, sora, snipe, woodcock, mourning dove, bobwhite quail, wild turkey, cottontail rabbit, squirrel, fox, coyote, white-tailed deer<br>On Columbia Mine: white-tailed deer, wild turkey | On Refuge fee title: Ducks, geese, coots, sora, snipe, woodcock, mourning dove, bobwhite quail, wild turkey, cottontail rabbit, squirrel, fox, coyote, white-tailed deer<br>On Columbia Mine: no hunting |
| Compatible with Refuge Goals and Purpose | Yes. Provides for priority non-consumptive public uses | Yes. Provides for priority public uses and maintain healthy wildlife populations to benefit the Refuge ecosystem | Yes. Provides for priority public uses and maintain healthy wildlife populations to benefit the Refuge ecosystem |
| Provides for Priority Public Uses | Yes. Provides for all priority uses but hunting | Yes. Provides for all priority uses | Yes. Provides for all priority uses on Refuge lands; 5 of 6 priority uses provided at Columbia Mine |
| Hunting and non-hunting activities segregated | On recently acquired. Does not allow hunting and therefore no conflict exists with non-hunting activities on recently acquired | No. Doesn't separate uses. | No. Doesn't separate uses except at Columbia Mine |
| Meets needs identified by public and partners | No. Does not maximize hunting opportunities as identified by most public and partners | Yes. Maximizes hunting opportunities as identified by most public and partners, while encouraging public safety | No. Does not maximize hunting opportunities as identified by most public and partners |

# CHAPTER 3. AFFECTED ENVIRONMENT

## SECTION 3.1 Physical Characteristics

The Patoka River NWR & MA is located within the Ohio River Valley Ecosystem (ORVE). This ecosystem drains a total area of approximately 141,000 square miles and includes portions of 10 states.

The rich flora and fauna of the ORVE reflect its diverse physiography and unique geologic past. Numerous trust species occur in the ecosystem, including many federally listed threatened or endangered plants, mussels, fishes, birds and mammals. The unusually rich and diverse fauna found in the ecosystem is the product of a multitude of biotic and abiotic factors which have evolved over time. Throughout geologic time, changes in such factors as topography, climate, and geomorphology have formed, modified, and eliminated habitats and consequently have had a profound effect upon the distribution of the faunal assemblages in the ecosystem. Due to the ecosystem's central geographical location in the eastern United States, some species with northern affinities and others with southern affinities occur in the ecosystem in addition to those common to the central region of the country.

Over the past few centuries of Euro-American settlement and industrialization, the Ohio River Valley ecosystem has been subjected to many environmental stresses which have diminished the bounty of its living resources. Much of the region's economic activity – agriculture, lumbering, mining, energy production, manufacturing, and recreation – is based on the watershed's natural resources. Sustaining most of these activities requires maintenance of a healthy ecosystem.

Historically, the Refuge was a part of the expansive, contiguous hardwood forest that covered most of the southwest Indiana. The Refuge strives to maintain a diverse mosaic of natural vegetation to benefit a diversity of wildlife and plants.

## SECTION 3.2 Biological Environment

### 3.2.1 Habitat

Flowing 162 miles through four counties in southwestern Indiana, the Patoka River represents a classic meandering midwestern stream. The Patoka River floodplain contains some of the finest examples of bottomland forested wetland remaining in the state. Although somewhat degraded by past drainage and land development efforts, the array of wetlands, forests, grasslands and other habitat types found within the Refuge boundary continue to support a rich diversity of fish and wildlife species.

**Forests**

*Bottomland Hardwood Forests*

Wetland management at Patoka River NWR & MA consists primarily of restoring bottomland forests. There are nearly 13,000 acres of existing bottomland hardwood forests or sites that

could be restored to bottomland hardwoods within the refuge acquisition boundary. With the aim of maximizing forest species diversity, the refuge plants 500 tree seedlings per acre on newly acquired sites (i.e. bottomland agricultural fields) where the objective is to restore a forested corridor along the Patoka River.

Ultimately, over the long term (100 years) the bottomland hardwood forests will be managed to maintain a mosaic of age and structural classes. Lower elevations are dominated by black willow, sweetgum, silver maple, and river birch. Pin oak, Shumard oak, swamp chestnut oak, swamp white oak, red maple, green ash, sycamore, and cottonwood dominate the mid-elevations, while upper elevations are typically comprised of cherrybark oak, hickory, and pecan.

*Upland Forests*

The total acreage of the upland forest within the refuge's acquisition boundary is 2,704 acres. Over the long term (100 years), the Refuge will maintain a mosaic of hardwood stands of different age and structural classes distributed on upland areas. These forests are dominated by white oaks, black oaks, hickory, and blackgum on drier sites, and by red oaks, yellow poplar, beech, sugar maple, walnut, hickory, and cherry on wetter sites.

**Wetlands**

*Emergent Wetlands*

The total acreage of emergent wetlands in the acquisition boundary is 775 acres. The current objective is to maintain presently owned emergent wetlands (approximately 500 acres) in a mixture of vegetation such as cattail, bulrush, sedges, spatterdock, water lily and smartweeds.

*Lakes and Ponds*

The total acreage of lakes and ponds within the refuge's acquisition boundary is 885 acres.

*Patoka River, Oxbows, and Patoka Tributaries*

The total acreage of the Patoka River, its oxbows and tributaries within the refuge acquisition boundary is 534 acres.

*Water Quality*

The Refuge's current objective is to improve water quality within the Patoka River and its tributaries to move towards compliance with Indiana Department of Environmental Management standards. The long-term goal is removal of the streams from the list of impaired waters.

*Moist Soil Units and Scrapes*

The Refuge currently manages over 300 acres of actively managed moist soil units.

The Refuge has restored small wetland scrapes covering approximately 30 acres. Some of these small wetlands have water control structures. Water is stored in shallow pools to encourage waterfowl, shorebird and marsh/waterbird use. Some wetlands are referred to as macrotopography wetlands which are shallow scrapes ranging from three inches to two feet deep and depend on flooding and/or rain events for their water supply. Bottomland hardwood trees have been planted all around these wetlands. They are set up for passive management to resemble old river oxbows.

Cane Ridge has four moist soil units that total 193 acres. These are managed to achieve shallow fall flooding, and are slowly drained in the spring. They are intended to benefit waterfowl and shorebirds and are allowed to vegetate and grow in the summer with moist soil plants. The four units can be managed independently enabling staff to maximize diversity.

At Dillin Bottoms, Ducks Unlimited designed and supervised construction of two moist soil units covering 62 acres. These units are designed to be flooded by reverse flow flap gates during high water or with a permanent station auger pump operated by a portable diesel engine and PTO shaft.

Over the medium term future, the Refuge will maintain existing moist soil areas and convert up to a total of 700 acres of bottomland farmland to moist soil management that provides a diversity of native herbaceous plant foods such as wild millet (Echinochloa spp.), panic grass (Panicum spp.), sedges (Cyperus spp. and Carex spp.), and beggarticks (Bidens spp.).

**Grasslands/Shrublands**

The Refuge has the opportunity to restore around 4,500 acres of grassland/shrubland/savanna within the acquisition boundary. Grassland types include reclaimed coal-mined land, restored prairie, and old field habitat. Reclaimed surface-mined land typically has been planted with non-native plants like sericea lespedeza and fescue to hold the soil in place and left to grow up in brush. Where conditions are appropriate, the refuge has restored native grasses and forbs on reclaimed mine land as well as agricultural fields. Very few fields have been allowed to naturally revegetate because of the threat of takeover by non-native plants present in the seedbank.

The 1,043 acres Columbia Mine, managed by the Refuge under a conservation easement, is comprised of nearly 700 acres of grassland, shrubland, and savanna.

**Cropland**

Within the acquisition boundary lies about 4,500 acres of bottomland farmland. For the most part, land acquired as cropland is being maintained as such until funds are secured to convert the land to moist soil units or bottomland forests. When fully acquired, the Refuge will choose to

keep nearly 2,000 acres open through farming or created moist soil units to ensure attractive habitat is provided for shorebirds, wading birds, and waterfowl. Continued farming is done in a partnership with the original farmer or a tenant farmer through an annual cooperative farming agreement.

### 3.2.2 Wildlife

The diverse habitats found within the Patoka River watershed support equally diverse wildlife populations, with more than 380 species of mammals, birds, reptiles, amphibians, fishes and mollusks known or expected to occur on the Refuge.

Birds

The Patoka River and surrounding wetland and upland areas provide an array of habitat types which fulfill the necessary breeding, feeding, migration and wintering requirements for a variety of avian species. Scientific surveys, organized bird counts and casual observations have recorded over 230 species of waterfowl, wading and shore birds, songbirds, game birds and others within the Refuge.

Mammals

Indiana is home to 54 species of mammals, of which 41 species occur on the Patoka River NWR & MA. These include an array of game, non-game and furbearing mammals.

Amphibians and Reptiles

The Patoka River valley is within the range of at least 60 species of herptiles, that is, snakes, turtles, lizards, skinks, salamanders, newts, sirens, toads and frogs (Conant, 1958). A diverse assortment of reptiles and amphibians occur on the Refuge and fill many important niches in the ecosystem's natural food chain. Because the majority of these species require moist woodlands, ponds, streams, marshes, swamps or quiet backwaters, Patoka River NWR & MA provides excellent herptilian habitat.

A comprehensive herpetofauna survey was conducted on the Refuge from February 2009 to October 2010. From a possible 62 species with ranges within the Refuge boundaries, 42 species were found and documented, including 17 new county records.

Insects

The exact number of insect species found in the Refuge is not known.

A comprehensive survey of dragonflies and damselflies (Odonata) was conducted in 2009. A total of 30 dragonfly species and 13 damselfly species were identified on the Refuge, including 13 species considered rare or imperiled for the state of Indiana (Batema and Landowski 2010).

Molluscs

Historically, the Patoka River supported a rich diversity of freshwater mussels that were utilized by Native Americans and wildlife alike. A survey of freshwater mussels conducted in 2000 along the entire length of the Patoka River and portions of its tributaries found 28 mussel species (Ecological Specialists, Inc. 2001). This is fewer than the 33 species reported in historic records. The segment of the Patoka River flowing through the Refuge contained 17 mussel species. No species were found in the channelized portion of the river probably because the habitat in this stretch has been altered so as to render it unsuitable.

Fish

Most of the Refuge's fishery resources are associated with the Patoka River and its wetlands. Two fisheries surveys of the Patoka River and many of its tributaries in the late 1980s and early 1990s revealed that fish populations were surprisingly diverse and abundant, especially considering the environmental abuses this river has endured over the past 70 years (Stefanavage, 1993; U.S. Fish and Wildlife Service, 1989). A total of 66 species of fish representing 15 families were found to inhabit these waters. Although not usually considered prime fish habitat, overall species diversity in the Patoka River in 1991 compared favorably with other southwest Indiana streams (Stefanavage, 1993).

### 3.2.3 Threatened, Endangered and Candidate Species

Federally listed Threatened and Endangered Species that occur within the boundaries of the Refuge include the Indiana bat (*Myotis sodalis),* least tern (interior population) (*Sterna antillarum),* and whooping crane (Grus Americana – experimental population).

In 2001, the U.S. Fish and Wildlife Service initiated a reintroduction of a Nonessential Experimental Population of whooping cranes in the Eastern United States. The intent was to establish a migratory flock that would summer and breed in Wisconsin and winter in west-central Florida which was historical habitat. Since the migration route is a learned rather than an innate behavior, captive-reared Whooping Cranes released in Wisconsin were led by ultralight aircraft to establish their historical flight path to suitable wintering areas in Florida. Annual stop overs on the Refuge have been documented in the spring, fall, and winter since 2001 during migration.

The Indiana bat was listed as federally endangered in 1967 under the Endangered Species Conservation Act, a precursor to the Endangered Species Act of 1973. Primarily the bats declined in number because of loss or disturbance of caves or other hibernacula. The bats hibernate communally in large numbers. Disruption or destruction of a single site can dramatically affect the population. It occurs in several locations across Indiana. A maternity colony containing more than 100 adults in a large dead tree was first documented on the Refuge in 2005.

The historic breeding range of the federally listed endangered Least Tern extended from Texas to Montana and from eastern Colorado and New Mexico to southern Indiana. It included large rivers of the Red, Missouri, Arkansas, Mississippi, Ohio, and Rio Grande River systems. It nests

on sand and gravel bars and protected beach areas of large rivers, and winters in coastal Central and South America. The species is endangered because human disturbance and alteration of river systems have rendered much of its nesting habitat unusable.

The 488-acre Cane Ridge Wildlife Management Area lies 24 miles west of the Refuge headquarters includes 193 acres of moist soil wetlands in four management units, 180 acres of reforested bottomland hardwoods, and a 59-acre deep water impoundment with nesting islands that provide habitat for the Least Tern. The terns have used the nesting islands for that purpose fledging an average of 40 young per year since 2005.

## SECTION 3.3 Land Use

Within the 22, 472 acre Refuge acquisition boundary there are approximately 15,700 acres of bottomlands and 6,700 acres of uplands, as determined by soil type. Within the bottomlands, over 9,000 acres are bottomland hardwood forest and associated wetlands, with the majority of the remaining 6,600 acres in farmland. The uplands are characterized by over 3,200 acres of farmland, 2,700 acres of forest, and the remaining acreage in other various cover types.

Farming is the main use within the Refuge boundary (approximately 12,000 acres), with corn, soybeans, and wheat being the primary cash crops.

## SECTION 3.4 Historical Properties and Cultural Resources

There are no known historical properties and cultural resources on the Refuge.

## SECTION 3.5 Local Socio-Economic Conditions

The Refuge is located in Pike and Gibson Counties, Indiana. Compared to the State of Indiana as a whole this two-county area has a smaller population growth rate and is less racially and ethnically diverse. On average, the area's population has a lower median income, and less high school and college education than the state's population.

### Population

The total population of the two counties was estimated to be 46,295 in 2013 by the U.S. Census Bureau. The two-county population was 97 percent white in 2013; the State population was 86.3 percent white.

### Employment

In 2000 there were a total of 21,744 full- and part-time jobs in Pike and Gibson counties. Farm/forestry/fishing employment accounted for about five percent of the jobs across the area. The manufacturing and education/health/social services industries were and are the largest economic and employment sectors in these counties (USCB, 2000a; USCB, 2000b).

### Income and Education

Average per-capita income in the two-county area was $22,343 in 2012; in Indiana it was $24,558. The median household income in the two-county area was $44,642 in 2012; in the state it was $48,374 (USCB, 2014).

In the two-county area, 12.1 percent of persons over 25 years of age hold a bachelor's degree or higher. The comparable figure in the state is 23 percent. This discrepancy is typical of the difference between largely rural areas like these seven counties and entire state populations which include large numbers of more urban residents who are professionals and have higher educational attainment on average (USCB, 2014).

# CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

This chapter describes the foreseeable environmental consequences of implementing the three management alternatives in Chapter 2. When detailed information is available, a scientific and analytic comparison between alternatives and their anticipated consequences is presented, which is described as "impacts" or "effects." When detailed information is not available, those comparisons are based on the professional judgment and experience of Refuge staff and Service and State biologists.

## SECTION 4.1 Alternative A: All recently acquired lands described in the 2014 Hunt Plan (1,334 acres) would remain closed to hunting, Public use on 7,110 acres acquired prior to 2013-2014 will remain unchanged. (No Action Alternative)

Without a hunting program on recently acquired land, these lands would essentially represent a sanctuary unavailable to the public for the harvest of wildlife resources. Under this Alternative, the Refuge would not fully meet one of its priority objectives, increasing public opportunities for outdoor recreation and environmental education, and would be contrary to the President's Executive Order (Management and General Public Use of the National Wildlife Refuge System) directing the Service to provide expanded opportunities on Refuges for compatible wildlife-dependent recreational activities, including hunting. Maintaining new Refuge lands as sanctuaries could encourage land acquisition adjacent to Refuge lands by private parties lured by the prospects of enhanced hunting opportunities. The result could impede the Service's ability to purchase properties within the Refuge Acquisition Boundary, thereby reducing the potential to fully realize the purposes for which the Refuge was established.

### 4.1.1 Habitat Impacts

No additional public use impacts on vegetation are expected with this alternative.

### 4.1.2 Biological Impacts

Potential damage to agricultural croplands, as well as to native vegetation, including tree plantings for forest restoration, may occur without herbivore population control provided by hunting.

### 4.1.3 Listed Species

No effect is expected for any of the threatened and endangered species found within the boundaries of the Refuge as a result of this alternative.

### 4.1.4 Historic Properties and Cultural Resources

There are no historical properties documented on current Refuge lands.

### 4.1.5 Cumulative Impact Analysis of the No Action Alternative

### 4.1.5.A Anticipated Direct and Indirect Impact on Wildlife Species

Under this alternative, 7,110 acres of Refuge land acquired prior to 2013-2014 would remain open to hunting as described in previous plans, while new acquisitions described in the 2014 Hunt Plan would remain closed to hunting. The Service has allowed and administered a public hunting program on the Refuge since the 1996. Recent estimates show that the Refuge received approximately 9,900 hunting visits in 2014.

The 1,334 acres included in this plan are widely scattered and treating these areas as sanctuaries would minimally affect wildlife species, except perhaps white-tailed deer. Deer populations would increase on those tracts that are large enough to support a local population. This alternative could allow deer populations to become too large for an individual unit which in turn would create a situation of the over browsing of vegetation. This can cause the degradation of the plant community and reduction of food available for other wildlife species. This would have negative impacts on other resident and non-resident wildlife populations whose life requirements include diverse vegetative communities.

Disturbance to Refuge wildlife would continue as is presently caused by non-consumptive users on tracts not open to hunting.

**Non-hunted Resident Wildlife:**

Non-hunted wildlife would include small mammals such as voles, moles, mice, and shrews; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory butterflies and moths, these species have very limited home ranges and hunting would not affect their populations regionally.

Some species of butterflies and moths are migratory. Cumulative effects to these species at the "flyway" level should be negligible. Any hunter interaction would be similar to that of non-consumptive users. Disturbance to non-hunted wildlife would increase slightly. However, significant disturbance would be unlikely since small mammals are generally inactive during late November and December and many of these species are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity when temperatures are low. Hunters would rarely

encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to nonhunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

*White-tailed Deer*

In the 2013 Deer Season Summary, the Indiana Department of Natural Resources (INDNR) reported deer harvest numbers from 1951 to 2013. The number of deer harvested in the state was below 20,000 until the early 1980's. Since then, the number of deer harvested has risen tremendously to a level where over 100,000 deer have been taken each year since 1992. Since 2004, hunters have harvested at least 120,000 deer each year. The report indicates that the 125,635 deer harvested in 2013 was 8% less than the 136,248 deer harvested in 2012.

Within Pike (1,419 deer harvested) and Gibson (1,475 deer harvested) counties, where the Refuge is located, harvest numbers were about average for any Indiana county in 2013.

According to the Hunter/Harvest Report from Sugar Ridge Fish and Wildlife Area, an 8,100 acre property managed by the INDNR for hunting opportunities and adjacent to the Refuge, 46 deer were taken in 2013-2014. Nearly 4 deer were taken per square mile at Sugar Ridge in 2013.

The Refuge does not perform any management practices specifically for white-tailed deer, although they may benefit from some of the habitat management practices and habitat restoration efforts undertaken on the Refuge for other species. In addition, much of the Refuge can be flooded during parts of the state deer season, thereby taking away potential deer habitat for parts of the year.

Without opening any new acquisitions as described in Alternative A, 7,110 acres (or approximately 11 square miles) would be open to hunting. Using the 4 deer/square mile harvested on Sugar Ridge FWA as an estimate, a maximum total of around 44 deer could be taken on the Refuge per year. Forty-four deer would represent 0.03% of the 125,635 deer harvested in Indiana in 2013.

*Wild Turkey*

The Refuge does not perform any management practices specifically for wild turkey, although they may benefit from some of the habitat management practices and habitat restoration efforts undertaken on the Refuge for other species. In addition, much of the Refuge can be flooded during parts of the state hunting season, thereby taking away potential wild turkey habitat for parts of the year.

According to the 2013-2014 Spring and Fall Wild Turkey Harvest Results from the INDNR Division of Fish and Wildlife 11,989 wild turkeys were harvested in Indiana by hunters in 2013-

2014. 161 wild turkeys (1.3% of the total harvest for IN) were harvested in Gibson County, while Pike County accounted for 238 harvested birds (2.0% of the total harvest for IN).

At Sugar Ridge FWA 14 wild turkeys were harvested in 2013-2014, over the 8,100 acre management area. It is estimated that 12 wild turkeys could be harvested on the 7,110 acre Refuge in any given year, or 0.1% of the total harvest in Indiana.

*Bobwhite Quail*

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife 15,080 hunters harvested an estimated 19,866 bobwhites in Indiana during the 2010-2011 season, down 5.9 % from the 2008 survey.

The Refuge currently provides approximately 1,000 acres of suitable quail habitat, most in scattered, small fragments. Within the 22,472 acre acquisition boundary exists perhaps another 1,000 acres of suitable habitat that could be added to the Refuge over time. Presently, the Refuge gets very few hunters pursuing quail on the small grassland areas. Some of the best quail habitat in Southwest Indiana is on reclaimed coal mined grasslands. Over time, as much of the local reclaimed coal mine ground is reverted to cropland or leased to private hunting parties, the Refuge could see an increased interest in quail hunting use.

In 2014 it was estimated that of 1750 upland game visits to the Refuge, that 48 were for quail hunting. Using the average success rate of 0.36 birds harvested per day in the field as calculated by INDNR, it is estimated that 17 quail are harvested on the 7,110 acres under Refuge management in a given year, or 0.08% of the total harvest in Indiana.

*Cottontail Rabbit*

According to the most recent publication of the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife an estimated 80,894 cottontail hunters harvested an estimated 248,985 rabbits in Indiana during the 2010–2011 season.. Hunters in southwest Indiana had the greatest success averaging 0.75 cottontails harvested per day of hunting effort.

The Refuge currently provides approximately 1,000 acres of suitable rabbit habitat, most in scattered, small fragments. Within the 22,472 acre acquisition boundary exists perhaps another 1,000 acres of suitable habitat that could be added to the Refuge over time. In addition to managed grassland/shrublands, Refuge tree plantings provide temporary habitat for rabbits during the first few years after planting. To date the Refuge has planted trees on over 1,000 acres of agricultural fields with the ultimate goal of restoring hardwood forests.

In 2014 it was estimated that of the 1800 upland game visits to the Refuge, that 389 visits were for rabbit hunting. Using the success rate of 0.75 rabbits per day per hunter as described by INDNR, it is estimated that 292 rabbits are harvested on suitable habitat on under Refuge

management in a given year, or 0.12% of the total harvest for the state.

*Squirrel (Gray and Fox)*

*Gray Squirrel*

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife an estimated 62,699 gray squirrel hunters harvested an estimated 212,033 gray squirrels in Indiana during the 2010-2011season.

The Refuge currently approximately 2,500 acres of mature large stands of hardwoods mostly in the eastern portion of the Refuge in Pike County that would provide ample habitat for the gray squirrel.

In 2014 it was estimated that of 1,750 upland game visits to the Refuge, that 97 were for gray squirrel hunting. Using the average success rate of 0.51 gray squirrel per day per hunter as described by INDNR, it is estimated that 49 gray squirrels are harvested on suitable habitat under Refuge management each year, or 0.023% of the total harvest for the state.

*Fox Squirrel*

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife an estimated 84,295 fox squirrel hunters harvested an estimated 375,117 fox squirrels in Indiana during the 2010-2011 season.

The Refuge currently provides a approximately 2,500 acres of fragmented forests interspersed with agricultural fields (both privately and Refuge owned) stands of hardwoods mostly in the western portion of the Refuge in Gibson County that provide suitable habitat for the fox squirrel.

In 2014 it was estimated that of 1750 upland game visits to the Refuge, that 486 were for fox squirrel hunting. Using the average success rate of 0.67 fox squirrel per day per hunter as described by INDNR, it is estimated that 325 fox squirrels are harvested on suitable habitat under Refuge management each year, or 0.09% of the total harvest for the state.

*Raccoon, Fox (Red and Gray), Coyote, and Opossum*

INDNR Division of Fish and Game show stable, huntable populations of these furbearers. This alternative would only allow the hunting of these species on the 7,110 acres of Refuge land acquired prior to 2013-2014. The hunting of these species is dependent on the price of pelts in any given year. Weather also plays a part in harvest. DNR estimates for harvest by hunters for the 2010-2011 seasons are shown on Table 2.

Table 2. 2010-2011 State Harvest Estimate for Hunting

| **Species** | **Indiana Harvest** |
|---|---|
| Raccoon | 117,265 |

| | |
|---|---|
| Fox (Red and Gray) | 4,189 (red) 1,216 (gray) |
| Coyote | 42,762 |
| Opossum | 9,060 |

Hunting regulations for these species on Patoka River NWR & MA units require a Refuge permit. Available habitat on Refuge units will limit harvest.

In 2013, 15 permits were given out for hunting furbearers on the 7,110 acres under Refuge management. One permit can cover a hunter for multiple species of furbearers. Of these 19 permits, 12 included coyote, 12 included raccoon, 11 included fox, and 9 included opossum. The results of the 2013 harvest reports from hunters indicated the following furbearers were taken on the Refuge: 0 raccoon, 0 fox, 0 coyote, and 0 opossum.

**Non-hunted Resident Wildlife**

Non-hunted wildlife would include small mammals such as voles, moles, mice, and shrews; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory butterflies and moths, these species have very limited home ranges and hunting would not affect their populations regionally.

Some species of butterflies and moths are migratory. Cumulative effects to these species at the "flyway" level should be negligible. Any hunter interaction would be similar to that of non-consumptive users. Disturbance to non-hunted wildlife would increase slightly. However, significant disturbance would be unlikely since small mammals are generally inactive during late November and early December and many of these species are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to nonhunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

**Migratory Birds**

Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for the protection and management of these birds. Under the Migratory Bird Treaty Act (16 U.S.C.703-712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any ... bird, or any part, nest, or egg" of migratory game birds can take place, and to adopt regulations for this purpose. These regulations are written after giving due regard to "the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, and are

updated annually" (16 U.S.C. 704(a)). This responsibility has been delegated to the U.S. Fish and Wildlife Service as the lead federal agency for managing and conserving migratory birds in the United States. Acknowledging regional differences in hunting conditions, the Service has administratively divided the nation into four Flyways for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member from each State and Province in that Flyway. Patoka River NWR & MA is located in the Mississippi Flyway.

The process for adopting migratory game bird hunting regulations, located in 50 CFR part 20, is constrained by three primary factors. Legal and administrative considerations dictate how long the rule making process will last. Most importantly, however, the biological cycle of migratory game birds controls the timing of data-gathering activities and thus the dates on which these results are available for consideration and deliberation. The process of adopting migratory game bird hunting regulations includes two separate regulations-development schedules based on "early" and "late" hunting season regulations. Early hunting seasons pertain to all migratory game bird species in Alaska, Hawaii, Puerto Rico, and the Virgin Islands; migratory game birds other than waterfowl (e.g. dove, woodcock, etc.); and special early waterfowl seasons, such as teal or resident Canada geese. Early hunting seasons generally begin prior to October 1. Late hunting seasons generally start on or after October 1 and include most waterfowl seasons not already established. There are basically no differences in the processes for establishing either early or late hunting seasons. For each cycle, Service biologists and others gather, analyze, and interpret biological survey data and provide this information to all those involved in the process through a series of published status reports and presentations to Flyway Councils and other interested parties.

Because the Service is required to take an abundance of migratory birds and other factors in to consideration, the Service undertakes a number of surveys throughout the year in conjunction with the Canadian Wildlife Service, State and Provincial wildlife-management agencies, and others. To determine the appropriate framework for each species, the Service considers factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort of State and Federal Governments. After Service establishment of final frameworks for hunting seasons, the States may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal frameworks but never more liberal. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a National Wildlife Refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows. The waterfowl season on Patoka River NWR & MA units will follow the frameworks set in place for Indiana.

*Waterfowl*

Waterfowl surveys are conducted during the late fall, winter, and early spring seasons. The data are used to provide managers and the public with current information on the distribution and abundance of waterfowl using the Refuge, and to identify annual trends in waterfowl use of wetlands and impoundments on the Refuge.

During the fall, winter, and spring, the Refuge wetlands support thousands of waterfowl, including Swans, Snow Geese, Canada Geese, Wood Ducks, Northern Pintail, Ring-necked Ducks, Mallards, Gadwall, American Wigeon, Northern Shoveler, Blue-winged Teal, and Green-winged Teal that use the Refuge as a stopover for rest and forage. Waterfowl that use the Refuge for nesting include Canada Goose, Mallard, Wood Duck, and Hooded Merganser.

The peak time for waterfowl use on the Refuge is January through mid-February (see Table 3). Aerial waterfowl surveys conducted in 2011, 2012, and 2014 indicated that over 17,000 ducks and geese may be using the Refuge along the Patoka River during this peak season. Over 200,000 ducks, geese, and swans have been documented in the area on February 8th, 2011 at Gibson Lake (Duke Energy), Tern Bar Slough (INDNR), and Cane Ridge (Refuge) (see Table 4). Currently, INDNR has set the South Zone seasons for ducks at November 1st through 9th and November 29th through January 18th and geese at November 11th through 10th and November 29th through January 31th. These dates provide hunting opportunities on the Refuge when waterfowl use is near its height.

Table 3. Aerial Waterfowl Inventory Data for Patoka River NWR & MA 2011, 2012, and 2014. Aerial survey below includes the western section of the Patoka River from HWY 41 to HWY 57.

| **2011** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *1/14/2011* | | *2/8/2011* | *2/15/2011* | *2/23/2011* | | | | |
| Total Ducks | 3,150 | | 7,300 | 1,350 | 1,860 | | | | |
| Total Geese | 925 | | 4,350 | 1,790 | 425 | | | | |
| Total Ducks/Geese | 4,075 | | 11,650 | 3,140 | 2,285 | | | | |
| **2012** | | | | | | | | | |
| | *1/18/2012* | | *2/3/2012* | *2/17/2012* | *2/22/2012* | *2/28/2012* | *3/5/2012* | *3/16/2012* | *3/28/2012* |
| Total Ducks | 9,630 | | 15,900 | 16,040 | 13,435 | 12,720 | 6,690 | 8,440 | 2,160 |
| Total Geese | 855 | | 1200 | 855 | 480 | 115 | 75 | 20 | 15 |
| Total Ducks/Geese | 10,485 | | 17,100 | 16,895 | 13,915 | 12,835 | 6,765 | 8,460 | 2,175 |
| | | | | | | | | | |
| **2013** | *1/14/2014* | *1/22/2014* | *1/28/2014* | *2/11/2014* | *2/18/2014* | | | | |
| Total Ducks | 3,250 | 1900 | 10 | 4037 | 210 | | | | |
| Total Geese | 6,710 | 1226 | 900 | 170 | 1600 | | | | |
| Total Ducks/Geese | 9,960 | 3,126 | 910 | 4,207 | 1,810 | | | | |

Table 4. Aerial Waterfowl Inventory Data for Patoka River NWR & MA 2011, 2012, and 2014. Aerial survey below includes Gibson Lake (Duke Energy), Tern Bar Slough (INDNR), and Cane Ridge Fish and Wildlife Area (FWS, managed by the Refuge).

| **2011** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *1/14/2011* | *2/8/2011* | *2/15/2011* | *2/23/2011* | *3/1/2012* | *3/6/2011* | *3/16/2011* | *3/24/2011* | *4/12/2011* |
| Total Ducks | 56,600 | 63,000 | 215 | 495 | 320 | 1,610 | 150 | 1,825 | 150 |
| Total Geese | 57,160 | 148,800 | 6,380 | 50 | 40 | 110 | 10 | 15 | 0 |
| Total Ducks/Geese | 113,760 | 211,800 | 6,595 | 545 | 360 | 1,720 | 160 | 1,840 | 150 |
| **2012** | | | | | | | | | |
| | *1/18/2012* | *1/24/2012* | *2/3/2012* | *2/17/2012* | *2/22/2012* | *2/28/2012* | *3/5/2012* | *3/16/2012* | *3/28/2012* |
| Total Ducks | 22,900 | 7,855 | 3,200 | 7,155 | 3,205 | 1,965 | 2,090 | 8,440 | 1,245 |
| Total Geese | 132,050 | 91,230 | 1,210 | 86,340 | 30,205 | 12,070 | 15,330 | 20 | 50 |
| Total Ducks/Geese | 154,950 | 99,085 | 4,410 | 93,495 | 33,410 | 14,035 | 17,420 | 8,460 | 1,295 |
| **2014** | | | | | | | | | |
| | *1/14/2014* | *1/22/2014* | *1/28/2014* | *2/11/2014* | *2/15/2014* | *2/18/2014* | | | |
| Total Ducks | 671 | 2,880 | 5,570 | 4,232 | 6,300 | 1,965 | | | |
| Total Geese | 49,510 | 2,200 | 76,730 | 74,825 | 85,720 | 50,900 | | | |
| Total Ducks/Geese | 50,181 | 5,080 | 82,300 | 79,057 | 92,020 | 52,865 | | | |

In the 2014 ***Migratory Bird Hunting Activity and Harvest During the 2012 and 2013 Hunting Seasons*** report, the Service estimates the seasonal duck harvest in Indiana to be 131,600 (2012) and 100,400 (2013) (see Figure 1). Ducks harvested per hunter day afield in Indiana was 1.37 (2012) and 1.41 (2013).

There are 76 days of duck hunting in SW Indiana for 2014 (early Teal season 9/6-9/21, regular duck season South Zone 11/1-11/9, 11/29-1/18). An estimated 40 duck hunters use the Refuge each day on the weekend (26 days), while an estimated 10 duck hunters use the Refuge each day during the week (50 days) for a total of 1,540 duck hunt users. Using an average of 1.39 ducks per day afield from the 2012-2013 seasons multiplied by 1,540 duck hunt visits to the Refuge indicates an 2,141 ducks (or 1.8% of the total harvest for the state) may be harvested on the Refuge in a given year.

In the 2014 ***Migratory Bird Hunting Activity and Harvest During the 2012 and 2013 Hunting Seasons*** report, the Service estimates the seasonal goose harvest in Indiana to be 60,400 (2012) and 54,900 (2013) (see Figure 2). Geese harvested per hunter day afield in Indiana was .88 (2012) and .81 (2013).

When compared to duck hunting, it is estimated that about ten percent of the waterfowl visits are specifically for geese. Currently, the Refuge has approximately 154 goose hunt visits per year.

Using an average of .85 geese averaged per day afield from the 2012-2013 seasons multiplied by 154 goose hunt visits to the Refuge indicates that 130 geese (or 0.2% of the total harvest for the state) may be harvested on the Refuge in a given year.


Figure 1. Total Number of Ducks Harvested in Indiana 1960-2012 (USFWS)

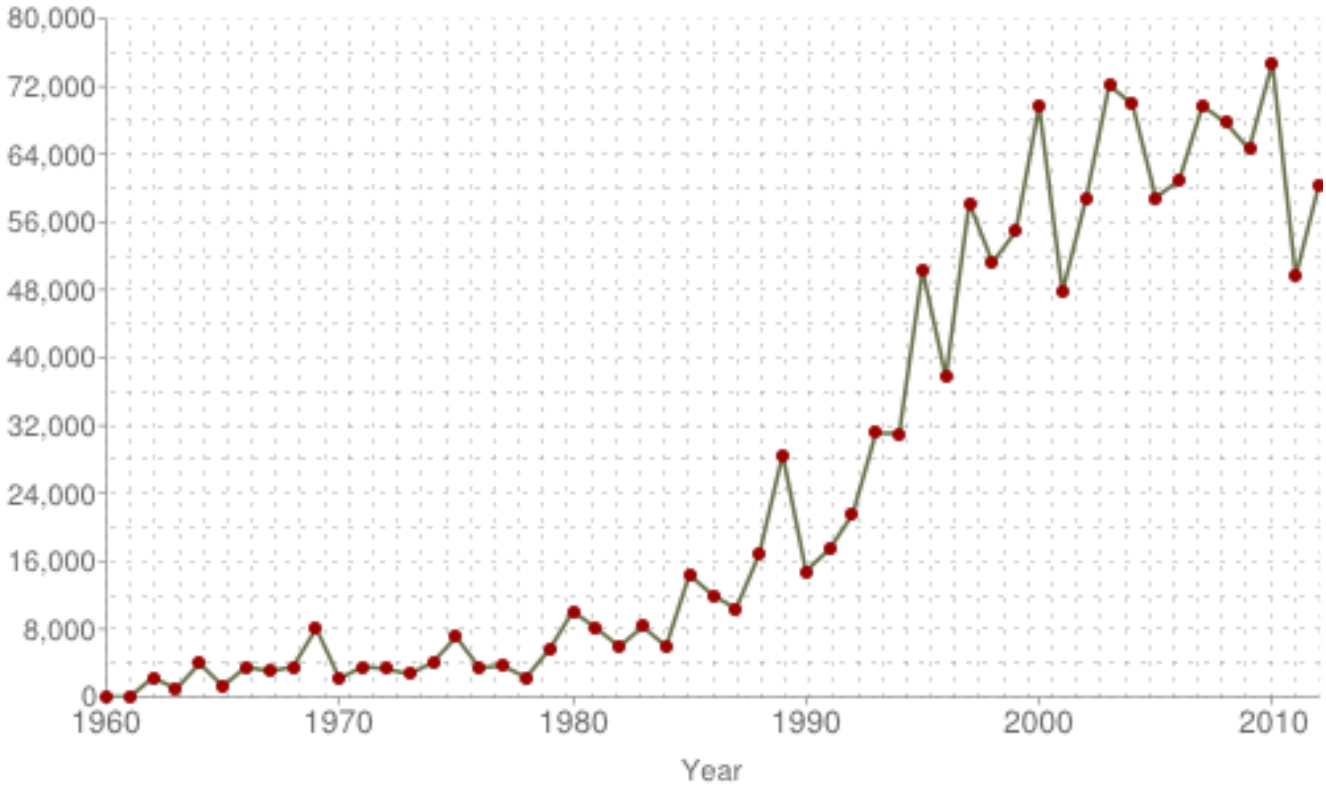


Figure 2. Total Number of Geese Harvested in Indiana 1960-2012 (USFWS)

*Mourning Doves*

In the 2014 ***Migratory Bird Hunting Activity and Harvest During the 2012 and 2013 Hunting Seasons*** report, the Service estimates the seasonal mourning dove harvest in Indiana to be 263,300 (2012) and 160,100 (2013). Doves harvested per hunter day afield in Indiana was 6.47 (2012) and 6.56 (2013). In the 2014 RAPP the Refuge had an estimated 500 migratory bird hunt visits for the year (an estimated 50 of these were for doves). Using an average of 6.5 doves per day afield from the 2012 and 2013 seasons multiplied by 50 dove hunt visits to the Refuge indicates an estimated 325 doves may have been harvested on the Refuge in a given year, or 0.1% of the total dove harvest for the state.

*Woodcock, Snipe, Sora, and Coot*

Although these species are all heard and seen on the Refuge, very few hunters attempt to harvest these species. The Refuge estimates 10 hunt visits per year total for woodcock, snipe, and sora, with an estimated total of 2 woodcock (0.2% of the state harvest total from 2012 and 2013), 3 snipe (0.1% of state harvest total from 2012 and 2013), and 3 sora (0.1% of the state harvest total for rails in 2012 and 2013) taken on the Refuge per year. For coot, it is estimated that two percent (or 31 visits) of the 1,540 waterfowl visits per year are for coot hunting. In the Migratory Bird Hunting Activity and Harvest During the 2012 and 2013 Hunting Seasons report, the Service estimates the seasonal coot harvest to be 1.47 coots harvested per day afield,

indicating the harvest on the Refuge is 46 coots per year, or 1.8% of the total harvest for the state.

### 4.1.5.B Anticipated Direct and Indirect Impact on Refuge Programs, Facilities, and Cultural Resources

Other Refuge Wildlife-Dependent Recreation
According to the 2014 RAPP Report, approximately 24,500 visitors used the Refuge units in 2014. Many of these visits were for hunting (9.900 visits). Non-consumptive visits totaled approximately 9,800.

Under this alternative, the public would not have the opportunity to participate in hunting land described in the 2014 Hunt Plan, which is one of the priority public uses, and compatible with the purposes for which the Refuge was established. Hunting is also a way for the public to gain an increased awareness of Patoka River NWR and the National Wildlife Refuge System. By not allowing hunting, the Service would not be meeting a public use demand and public relations would not be enhanced with the local community.

While not open to hunting, all units specified in the 2014 Hunt Plan would be open to other priority uses including fishing, nature observation, photography, education, and interpretation.

Refuge Facilities
No additional impacts to Refuge facilities (roads, parking lots, trails) will occur with this alternative. Under this alternative, 7,110 acres would be open to hunting (those approved through previous Hunt Plan and EA), while lands in the 2014 Hunt Plan would be closed to hunting, and wouldn't experience potential impacts to facilities by hunters.

Maintenance or improvement of existing roads and parking areas will cause minimal short term impacts to localized soils and may cause some temporary wildlife disturbance.

Cultural Resources
This alternative will not have any additional impacts to cultural resources.

### 4.1.5.C Anticipated Direct and Indirect Impact on Refuge Environment and Community

The No Action alternative will have little if any impact on soils, air quality, water quality or solitude. Vegetation, as stated above, could be affected if the deer population increases to a level to cause degradation of plant communities.

This alternative may have impacts on hunting opportunities in the local area. Over the last 15 years it has become increasingly difficult for hunters to acquire access to hunt on private land throughout southwest Indiana. More and more landowners are either leasing their land for an entire season, charging hunters a daily fee, or selling their land for recreational use. This change in land use has increased the importance of public land to hunters. Not opening these units to

hunting will result in the continued decrease of lands open to hunting for many hunters.

However, this alternative could possibly make the private land adjacent to these units more valuable. The landowner will have a wildlife sanctuary adjacent to their land which could conceivably make their property more valuable for leasing or to sell.

#### 4.1.5.D Other Past, Present, Proposed, and Reasonably Foreseeable Hunts and Anticipated Impacts

Hunting was allowed on most of these lands when they were in private ownership before they became part of the Refuge. This alternative would not allow hunting on lands described in the 2014 Hunt Plan and therefore there would be no anticipated impacts from this alternative.

#### 4.1.5.E Anticipated Impacts If Individual Hunts are Allowed to Accumulate

This alternative would not allow hunting on lands detailed in the 2014 Hunt Plan and therefore there would be no anticipated impacts.

### 4.1.6 Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations" was signed by President Bill Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities access to public information and participation in matters relating to human health or the environment. This assessment has not identified any adverse or beneficial effects for either alternative unique to minority or low-income populations in the affected area.

This alternative will not disproportionately place any adverse environmental, economic, social, nor health impacts on minority or low income populations.

Hunting opportunities proposed on Patoka River NWR & MA already exist on state, federal and other public lands in the area where the Refuge units are located. Maintaining the "Closed to Hunting" status on Refuge fee title lands does not provide for all the priority public uses identified as goals of the Refuge or the National Wildlife Refuge System. The Refuge Recreation Act of 1962 (16 U.S.C. 460K) and the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668-ddee) provide authorization for hunting on National Wildlife Refuges. The effects of hunting on Refuges have been examined in several environmental review documents, including the Final Environmental Impact Statement on the Operation of the National Wildlife Refuge System (1976), Recommendations on the Management of the National Wildlife Refuge System (1978), and the Draft Environmental Impact Statement on the Management of the National Wildlife Refuges (1988). Nothing in the establishing authority for the Refuge precludes

hunting on the Refuge.

**SECTION 4.2 Alternative B: As described in the 2014 Hunt Plan, allow the hunting of migratory game birds, upland game, and big game species on recently acquired fee title lands (291 acres) and selected hunting on the Columbia Mine Conservation Easement (1,043 acres) in accordance with federal regulations, Refuge-specific regulations, the Columbia Mine Public Use Plan, and the laws of the State of Indiana. Public use on 7,110 acres acquired prior to 2013-2014 will remain unchanged. (Preferred Alternative)**

Under this alternative, the fee title tracts detailed in the 2014 Hunt Plan would be opened to the same specifications allowed for hunting on the 7,110 acres administered by the Refuge prior to 2014 as allowed by federal regulations, Refuge-specific regulations, and the laws of the State of Indiana.

The 1,043 acre Columbia Mine Unit is private property owned by Sycamore Land Trust, Inc., and managed as part of the larger Refuge complex by the Refuge through a Conservation Easement. Because the Columbia Mine Unit is private property, it is subject to a Public Use Plan with hunting opportunities described and agreed upon by all conservation partners. Hunting opportunities on this tract will be limited to 3 weeks of deer hunting (the first week of archery, gun, and muzzleloader), spring turkey season, and waterfowl hunting is restricted to boats only (no shoreline hunting) on the Columbia Mine Section of Snakey Point Marsh. All other game species will not be hunted on the Columbia Mine tract.

In total 8,444 acres would be open to hunting.

### 4.2.1 Habitat Impacts

Hunting access, in most cases, will be by foot access only. Parking will be restricted to designated parking lots. Impacts on vegetation should be temporary and similar to that occurring from non-consumptive users. Hunters with disabilities will be accommodated on a case by case basis.

### 4.2.2 Biological Impacts

Given the nature of these lands, disturbance of migratory birds, upland and small and big game, and resident wildlife will be the same as occurs on the surrounding state Fish and Wildlife Management Areas (FWA).

The harvest of Refuge wildlife species will be in accordance with Refuge-specific regulations, Federal regulations, and Indiana state limits. Other wildlife not being harvested will be disturbed by hunters approaching an animal's site, and flushing or moving the wildlife as the animals try to avoid human contact. This disturbance will be similar to the disturbance non hunted animals experience on state FWAs and will be minimal and temporary in nature.

### 4.2.3 Listed Species

No effect is expected for any federally listed threatened or endangered species or their critical

habitat. A consultation pursuant to Section 7 of the Endangered Species Act was conducted as part of this EA and the updated Hunt Plan. A finding of "No Effects' was determined. No impacts are anticipated for state listed species.

### 4.2.4 Historic Properties and Cultural Resources

There are no historical properties documented on current Refuge lands.

### 4.2.5 Cumulative Impact Analysis of the Proposed Action

#### 4.2.5.A Anticipated Direct and Indirect Impact of Proposed Hunting on Wildlife Species

The Service has allowed and administered a public hunting program on the Refuge since the 1996. Recent estimates show that the Refuge received approximately 9,900 hunting visits in 2014. During its history, the Service has not noted any significant adverse effects of these programs on the administration of the Refuge, and has determined that this use is compatible with the purposes of the Refuge and the NWR System's mission statement.

Hunting accounts for about 40% of the visits to the Refuge per year. The allowance of hunting on newly acquired Refuge lands will expose the largest user group to the Refuge habitats and facilitate a better appreciation and understanding of the local ecosystem. Also the allowance of public hunting will nurture a cooperative relationship with adjacent landowners by minimizing crop depredation. The majority of lands that will become Service owned tracts of Refuge are in private ownership when purchased by the Service. In Indiana, the majority of private rural lands are hunted on during at least some of the state seasons. Any impacts that hunting is having on the land and its wildlife populations are already occurring and the change in ownership to the Service, and the subsequent hunting, will have little to no impact on wildlife populations.

In some cases, once owned by the Service, the hunting on these lands will be more restrictive than the current situation due to the Refuge's regulations being more restrictive than the state seasons.

**Non-hunted Resident Wildlife:**

Non-hunted wildlife would include small mammals such as voles, moles, mice, and shrews; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory butterflies and moths, these species have very limited home ranges and hunting would not affect their populations regionally.

Some species of butterflies and moths are migratory. Cumulative effects to these species at the "flyway" level should be negligible. Any hunter interaction would be similar to that of non-consumptive users. Disturbance to non-hunted wildlife would increase slightly. However, significant disturbance would be unlikely since small mammals are generally inactive during late November and December and many of these species are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood reptiles

and amphibians also limits their activity when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to nonhunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

*White-tailed Deer*

In the 2013 Deer Season Summary, the Indiana Department of Natural Resources (INDNR) reported deer harvest numbers from 1951 to 2013. The number of deer harvested in the state was below 20,000 until the early 1980's. Since then, the number of deer harvested has risen tremendously to a level where over 100,000 deer have been taken each year since 1992. Since 2004, hunters have harvested at least 120,000 deer each year. The report indicates that the 125,635 deer harvested in 2013 was 8% less than the 136,248 deer harvested in 2012.

Within Pike (1,419 deer harvested) and Gibson (1,475 deer harvested) counties, where the Refuge is located, harvest numbers were about average for any Indiana county in 2013.

According to the Hunter/Harvest Report from Sugar Ridge Fish and Wildlife Area, an 8,100 acre property managed by the INDNR for hunting opportunities and adjacent to the Refuge, 46 deer were taken in 2013-2014. Nearly 4 deer were taken per square mile at Sugar Ridge in 2013.

The Refuge does not perform any management practices specifically for white-tailed deer, although they may benefit from some of the habitat management practices and habitat restoration efforts undertaken on the Refuge for other species. In addition, much of the Refuge can be flooded during parts of the state deer season, thereby taking away potential deer habitat for parts of the year.

Opening 1,334 acres to hunting as proposed in the 2014 Hunt Plan will result in an estimated additional 8 deer harvested on newly opened Refuge lands per year, which equates to 0.007% of the total harvest for the state in 2013.

Opening 1,334 acres to hunting brings the Refuge-owned huntable land to a total of 8,444 acres (or approximately 13.19 square miles). Using the 4 deer/square mile harvested on Sugar Ridge FWA as an estimate, a maximum total of around 53 deer could be taken on the Refuge per year. Fifty-three deer would represent 0.042% of the 125,635 deer harvested in Indiana in 2013.

*Wild Turkey*

The Refuge does not perform any management practices specifically for wild turkey, although they may benefit from some of the habitat management practices and habitat restoration efforts undertaken on the Refuge for other species. In addition, much of the Refuge can be flooded during parts of the state hunting season, thereby taking away potential wild turkey habitat for

parts of the year.

According to the 2013-2014 Spring and Fall Wild Turkey Harvest Results from the INDNR Division of Fish and Wildlife 11,989 wild turkeys were harvested in Indiana by hunters in 2013-2014. 161 wild turkeys (1.3% of the total harvest for IN) were harvested in Gibson County, while Pike County accounted for 238 harvested birds (2.0% of the total harvest for IN).

At adjacent Sugar Ridge FWA 14 wild turkeys were harvested in 2013-2014, over the 8,100 acre management area, or 1.1 wild turkeys harvested per square mile.

Opening 1,334 acres to hunting as proposed in the 2014 Hunt Plan will result in an estimated additional 2 wild turkey harvested on newly opened Refuge lands per year, which equates to 0.02% of the total harvest for the state in 2013.

Opening 1,334 acres to hunting brings the Refuge-owned huntable land to a total of 8,444 acres (or approximately 13.19 square miles). Using the 1.1 turkey/square mile harvested on Sugar Ridge FWA as an estimate, a maximum total of around 15 wild tukey could be taken on the Refuge per year. Fifteen wild turkey would represent 0.12% of the 11,989 wild turkeys harvested in Indiana in 2013.

*Bobwhite Quail*

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife 15,080 hunters harvested an estimated 19,866 bobwhites in Indiana during the 2010-2011 season, down 5.9 % from the 2008 survey.

The Refuge currently provides approximately 1,000 acres of suitable quail habitat, most in scattered, small fragments. Within the 22,472 acre acquisition boundary exists perhaps another 1,000 acres of suitable habitat that could be added to the Refuge over time. Presently, the Refuge gets very few hunters pursuing quail on the small grassland areas. Some of the best quail habitat in Southwest Indiana is on reclaimed coal mined grasslands. Over time, as much of the local reclaimed coal mine ground is reverted to cropland or leased to private hunting parties, the Refuge could see an increased interest in quail hunting use.

In 2014 it was estimated that of 1750 upland game visits to the Refuge, that 48 were for quail hunting. Using the average success rate of 0.36 birds harvested per day in the field as calculated by INDNR, it is estimated that 17 quail are harvested on the 7,110 acres under Refuge management in a given year, or 0.08% of the total harvest in Indiana.

Opening 291 acres to hunting (Columbia Mine will remain closed) as proposed in the 2014 Hunt Plan will result in an estimated additional 2 quail hunts per year on newly opened Refuge land. Using the success rate of 0.36 birds harvested per day in the field as calculated by INDNR, it is estimated that .71 additional birds will be harvested on newly opened Refuge lands, which accounts for 0.004% of the total overall harvest in Indiana. Additionally, it is estimated that 18

quail could be harvested on the 7,401 acres under Refuge management (with the new acquisitions) in a given year, or 0.01% of the total harvest in Indiana.

*Cottontail Rabbit*

According to the most recent publication of the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife an estimated 80,894 cottontail hunters harvested an estimated 248,985 rabbits in Indiana during the 2010–2011 season.. Hunters in southwest Indiana had the greatest success averaging 0.75 cottontails harvested per day of hunting effort.

The Refuge currently provides approximately 1,000 acres of suitable rabbit habitat, most in scattered, small fragments. Within the 22,472 acre acquisition boundary exists perhaps another 1,000 acres of suitable habitat that could be added to the Refuge over time. In addition to managed grassland/shrublands, Refuge tree plantings provide temporary habitat for rabbits during the first few years after planting. To date the Refuge has planted trees on over 1,000 acres of agricultural fields with the ultimate goal of restoring hardwood forests.

In 2014 it was estimated that of the 1800 upland game visits to the Refuge, that 389 visits were for rabbit hunting. Using the success rate of 0.75 rabbits per day per hunter as described by INDNR, it is estimated that opening 291 acres to hunting (Columbia Mine will remain closed) as proposed in the 2014 Hunt Plan will result in an additional 16 rabbit hunt visits per year, and an additional harvest of 12 rabbits or 0.005% of the total harvest for the state. Four-hundred and five rabbit hunts could lead to an estimated harvest of 304 rabbits on the 7,401 acres under Refuge management (with the new acquisitions) in a given year, or 0.12% of the total harvest in Indiana.

*Squirrel (Gray and Fox)*

*Gray Squirrel*

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife an estimated 62,699 gray squirrel hunters harvested an estimated 212,033 gray squirrels in Indiana during the 2010-2011season.

The Refuge currently approximately 2,500 acres of mature large stands of hardwoods mostly in the eastern portion of the Refuge in Pike County that would provide ample habitat for the gray squirrel.

In 2014 it was estimated that of 1,750 upland game visits to the Refuge, that 97 were for gray squirrel hunting. Using the success rate of 0.51 gray squirrel per day per hunter as described by INDNR, opening 291 acres to hunting (Columbia Mine will remain closed) as proposed in the 2014 Hunt Plan will result in an estimated additional 4 gray squirrel hunt visits per year, and an additional harvest of 2 gray squirrel or 0.0009% of the total harvest for the state in the 2010-2011 season. One-hundred and one gray squirrel hunts could lead to an estimated harvest of 52 gray

squirrels on the 7,401 acres under Refuge management (with the new acquisitions) in a given year, or 0.02% of the total harvest in Indiana.

*Fox Squirrel*

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife an estimated 84,295 fox squirrel hunters harvested an estimated 375,117 fox squirrels in Indiana during the 2010-2011 season.

The Refuge currently provides a approximately 2,500 acres of fragmented forests interspersed with agricultural fields (both privately and Refuge owned) stands of hardwoods mostly in the western portion of the Refuge in Gibson County that provide suitable habitat for the fox squirrel.

In 2014 it was estimated that of 1750 upland game visits to the Refuge, that 486 were for fox squirrel hunting. Using the average success rate of 0.67 fox squirrel per day per hunter as described by INDNR, opening 291 acres to hunting (Columbia Mine will remain closed) as proposed in the 2014 Hunt Plan will result in an estimated additional 20 fox squirrel hunt visits per year, and an additional harvest of 13 fox squirrel or 0.003% of the total harvest for the state in the 2010-2011 season. Five-hundred and six fox squirrel hunts could lead to an estimated harvest of 339 fox squirrels on the 7,401 acres under Refuge management (with the new acquisitions) in a given year, or 0.09% of the total harvest in Indiana.

*Raccoon, Fox (Red and Gray), Coyote, and Opossum*

INDNR Division of Fish and Game show stable, huntable populations of these furbearers. This alternative would only allow the hunting of these species on the 7,110 acres of Refuge land acquired prior to 2013-2014. The hunting of these species is dependent on the price of pelts in any given year. Weather also plays a part in harvest. DNR estimates for harvest by hunters for the 2010-2011 seasons are shown on Table 2.

Table 2. 2010-2011 State Harvest Estimate for Hunting

| **Species** | **Indiana Harvest** |
|---|---|
| Raccoon | 117,265 |
| Fox (Red and Gray) | 4,189 (red) 1,216 (gray) |
| Coyote | 42,762 |
| Opossum | 9,060 |

Hunting regulations for these species on Patoka River NWR & MA units require a Refuge permit. Available habitat on Refuge units will limit harvest.

In 2013, 15 permits were given out for hunting furbearers on the 7,110 acres under Refuge management. One permit can cover a hunter for multiple species of furbearers. Of these 19 permits, 12 included coyote, 12 included raccoon, 11 included fox, and 9 included opossum. The

results of the 2013 harvest reports from hunters indicated the following furbearers were taken on the Refuge: 0 raccoon, 0 fox, 0 coyote, and 0 opossum.

Opening 291 acres to hunting as proposed in the 2014 Hunt Plan will result in an estimated additional 0.6 Refuge permits given for hunting furbearers. No furbearers were harvested on the Refuge in 2013, and the harvest with the addition of less than one permitee is expected to be minimal.

**Non-hunted Resident Wildlife**

Non-hunted wildlife would include small mammals such as voles, moles, mice, and shrews; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory butterflies and moths, these species have very limited home ranges and hunting would not affect their populations regionally.

Some species of butterflies and moths are migratory. Cumulative effects to these species at the "flyway" level should be negligible. Any hunter interaction would be similar to that of non-consumptive users. Disturbance to non-hunted wildlife would increase slightly. However, significant disturbance would be unlikely since small mammals are generally inactive during late November and early December and many of these species are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to nonhunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

**Migratory Birds**

Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for the protection and management of these birds. Under the Migratory Bird Treaty Act (16 U.S.C.703-712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any ... bird, or any part, nest, or egg" of migratory game birds can take place, and to adopt regulations for this purpose. These regulations are written after giving due regard to "the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, and are updated annually" (16 U.S.C. 704(a)). This responsibility has been delegated to the U.S. Fish and Wildlife Service as the lead federal agency for managing and conserving migratory birds in the United States. Acknowledging regional differences in hunting conditions, the Service has administratively divided the nation into four Flyways for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway

Council, a formal organization generally composed of one member from each State and Province in that Flyway. Patoka River NWR & MA is located in the Mississippi Flyway.

The process for adopting migratory game bird hunting regulations, located in 50 CFR part 20, is constrained by three primary factors. Legal and administrative considerations dictate how long the rule making process will last. Most importantly, however, the biological cycle of migratory game birds controls the timing of data-gathering activities and thus the dates on which these results are available for consideration and deliberation. The process of adopting migratory game bird hunting regulations includes two separate regulations-development schedules based on "early" and "late" hunting season regulations. Early hunting seasons pertain to all migratory game bird species in Alaska, Hawaii, Puerto Rico, and the Virgin Islands; migratory game birds other than waterfowl (e.g. dove, woodcock, etc.); and special early waterfowl seasons, such as teal or resident Canada geese. Early hunting seasons generally begin prior to October 1. Late hunting seasons generally start on or after October 1 and include most waterfowl seasons not already established. There are basically no differences in the processes for establishing either early or late hunting seasons. For each cycle, Service biologists and others gather, analyze, and interpret biological survey data and provide this information to all those involved in the process through a series of published status reports and presentations to Flyway Councils and other interested parties.

Because the Service is required to take an abundance of migratory birds and other factors in to consideration, the Service undertakes a number of surveys throughout the year in conjunction with the Canadian Wildlife Service, State and Provincial wildlife-management agencies, and others. To determine the appropriate framework for each species, the Service considers factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort of State and Federal Governments. After Service establishment of final frameworks for hunting seasons, the States may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal frameworks but never more liberal. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a National Wildlife Refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows. The waterfowl season on Patoka River NWR & MA units will follow the frameworks set in place for Indiana.

*Waterfowl*

Waterfowl surveys are conducted during the late fall, winter, and early spring seasons. The data are used to provide managers and the public with current information on the distribution and abundance of waterfowl using the Refuge, and to identify annual trends in waterfowl use of wetlands and impoundments on the Refuge.

During the fall, winter, and spring, the Refuge wetlands support thousands of waterfowl, including Swans, Snow Geese, Canada Geese, Wood Ducks, Northern Pintail, Ring-necked Ducks, Mallards, Gadwall, American Wigeon, Northern Shoveler, Blue-winged Teal, and Green-winged Teal that use the Refuge as a stopover for rest and forage. Waterfowl that use the Refuge for nesting include Canada Goose, Mallard, Wood Duck, and Hooded Merganser.

The peak time for waterfowl use on the Refuge is January through mid-February (see Table 3). Aerial waterfowl surveys conducted in 2011, 2012, and 2014 indicated that over 17,000 ducks and geese may be using the Refuge along the Patoka River during this peak season. Over 200,000 ducks, geese, and swans have been documented in the area on February 8th, 2011 at Gibson Lake (Duke Energy), Tern Bar Slough (INDNR), and Cane Ridge (Refuge) (see Table 4). Currently, INDNR has set the South Zone seasons for ducks at November 1st through 9th and November 29th through January 18th and geese at November 11th through 10th and November 29th through January 31th. These dates provide hunting opportunities on the Refuge when waterfowl use is near its height.

Table 3. Aerial Waterfowl Inventory Data for Patoka River NWR & MA 2011, 2012, and 2014. Aerial survey below includes the western section of the Patoka River from HWY 41 to HWY 57.

| **2011** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *1/14/2011* | | *2/8/2011* | *2/15/2011* | *2/23/2011* | | | | |
| Total Ducks | 3,150 | | 7,300 | 1,350 | 1,860 | | | | |
| Total Geese | 925 | | 4,350 | 1,790 | 425 | | | | |
| Total Ducks/Geese | 4,075 | | 11,650 | 3,140 | 2,285 | | | | |
| **2012** | | | | | | | | | |
| | *1/18/2012* | | *2/3/2012* | *2/17/2012* | *2/22/2012* | *2/28/2012* | *3/5/2012* | *3/16/2012* | *3/28/2012* |
| Total Ducks | 9,630 | | 15,900 | 16,040 | 13,435 | 12,720 | 6,690 | 8,440 | 2,160 |
| Total Geese | 855 | | 1200 | 855 | 480 | 115 | 75 | 20 | 15 |
| Total Ducks/Geese | 10,485 | | 17,100 | 16,895 | 13,915 | 12,835 | 6,765 | 8,460 | 2,175 |
| | | | | | | | | | |
| **2013** | *1/14/2014* | *1/22/2014* | *1/28/2014* | *2/11/2014* | *2/18/2014* | | | | |
| Total Ducks | 3,250 | 1900 | 10 | 4037 | 210 | | | | |
| Total Geese | 6,710 | 1226 | 900 | 170 | 1600 | | | | |
| Total Ducks/Geese | 9,960 | 3,126 | 910 | 4,207 | 1,810 | | | | |

Table 4. Aerial Waterfowl Inventory Data for Patoka River NWR & MA 2011, 2012, and 2014. Aerial survey below includes Gibson Lake (Duke Energy), Tern Bar Slough (INDNR), and Cane Ridge Fish and Wildlife Area (FWS, managed by the Refuge).

| **2011** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *1/14/2011* | *2/8/2011* | *2/15/2011* | *2/23/2011* | *3/1/2012* | *3/6/2011* | *3/16/2011* | *3/24/2011* | *4/12/2011* |
| Total Ducks | 56,600 | 63,000 | 215 | 495 | 320 | 1,610 | 150 | 1,825 | 150 |
| Total Geese | 57,160 | 148,800 | 6,380 | 50 | 40 | 110 | 10 | 15 | 0 |
| Total Ducks/Geese | 113,760 | 211,800 | 6,595 | 545 | 360 | 1,720 | 160 | 1,840 | 150 |
| **2012** | | | | | | | | | |
| | *1/18/2012* | *1/24/2012* | *2/3/2012* | *2/17/2012* | *2/22/2012* | *2/28/2012* | *3/5/2012* | *3/16/2012* | *3/28/2012* |
| Total Ducks | 22,900 | 7,855 | 3,200 | 7,155 | 3,205 | 1,965 | 2,090 | 8,440 | 1,245 |
| Total Geese | 132,050 | 91,230 | 1,210 | 86,340 | 30,205 | 12,070 | 15,330 | 20 | 50 |
| Total Ducks/Geese | 154,950 | 99,085 | 4,410 | 93,495 | 33,410 | 14,035 | 17,420 | 8,460 | 1,295 |
| **2014** | | | | | | | | | |
| | *1/14/2014* | *1/22/2014* | *1/28/2014* | *2/11/2014* | *2/15/2014* | *2/18/2014* | | | |
| Total Ducks | 671 | 2,880 | 5,570 | 4,232 | 6,300 | 1,965 | | | |
| Total Geese | 49,510 | 2,200 | 76,730 | 74,825 | 85,720 | 50,900 | | | |
| Total Ducks/Geese | 50,181 | 5,080 | 82,300 | 79,057 | 92,020 | 52,865 | | | |

In the 2014 ***Migratory Bird Hunting Activity and Harvest During the 2012 and 2013 Hunting Seasons*** report, the Service estimates the seasonal duck harvest in Indiana to be 131,600 (2012) and 100,400 (2013) (see Figure 1). Ducks harvested per hunter day afield in Indiana was 1.37 (2012) and 1.41 (2013).

There are 76 days of duck hunting in SW Indiana for 2014 (early Teal season 9/6-9/21, regular duck season South Zone 11/1-11/9, 11/29-1/18). An estimated 40 duck hunters use the Refuge each day on the weekend (26 days), while an estimated 10 duck hunters use the Refuge each day during the week (50 days) for a total of 1,540 duck hunt users. Using an average of 1.39 ducks per day afield from the 2012-2013 seasons multiplied by 65 duck hunt visits to the Refuge indicates an additional harvest of 90 ducks, or 0.08% of the total harvest for the state may be harvested on the Refuge in a given year.

Opening 311 acres (includes 20 acres of Snakey Point Marsh) to hunting as proposed in the 2014 Hunt Plan will result in an estimated 65 additional hunt use days. Using an average of 1.39 ducks per day afield from the 2012-2013 seasons multiplied by 65 duck hunt visits to the Refuge indicates an additional harvest of 90 ducks, or 0.08% of the total harvest for the state may be harvested on newly opened Refuge lands in a given year.

One-thousand six-hundred and five duck hunt days on the 7,421 acres under Refuge management (with the new acquisitions, and the 20 acre Snakey Point Marsh part of Columbia Mine open for waterfowl) in a given year, would lead to an estimated harvest of 2,231 ducks or 1.9% of the total harvest in Indiana in 2013.

In the 2014 ***Migratory Bird Hunting Activity and Harvest During the 2012 and 2013 Hunting Seasons*** report, the Service estimates the seasonal goose harvest in Indiana to be 60,400 (2012) and 54,900 (2013) (see Figure 2). Geese harvested per hunter day afield in Indiana was .88 (2012) and .81 (2013).

When compared to duck hunting, it is estimated that about ten percent of the waterfowl visits are specifically for geese. Currently, the Refuge has approximately 154 goose hunt visits per year. Using an average of .85 geese averaged per day afield from the 2012-2013 seasons multiplied by 154 goose hunt visits to the Refuge indicates that 130 geese (or 0.2% of the total harvest for the state) may be harvested on the Refuge in a given year.

Opening 311 acres (includes 20 acres of Snakey Point Marsh) to hunting as proposed in the 2014 Hunt Plan will result in an estimated 7 additional hunt use days. Using an average of .85 geese per day afield from the 2012-2013 seasons multiplied by 7 goose hunt visits to the Refuge indicates an additional harvest of 6 geese, or 0.01% of the total harvest for the state may be harvested on newly opened Refuge lands in a given year.

One-hundred and sixty-one goose hunt days on the 7,421 acres under Refuge management (with the new acquisitions, and the 20 acre Snakey Point Marsh part of Columbia Mine open for waterfowl) in a given year, would lead to an estimated harvest of 137 geese or 0.25% of the total harvest in Indiana in 2013.

Figure 1. Total Number of Ducks Harvested in Indiana 1960-2012 (USFWS)

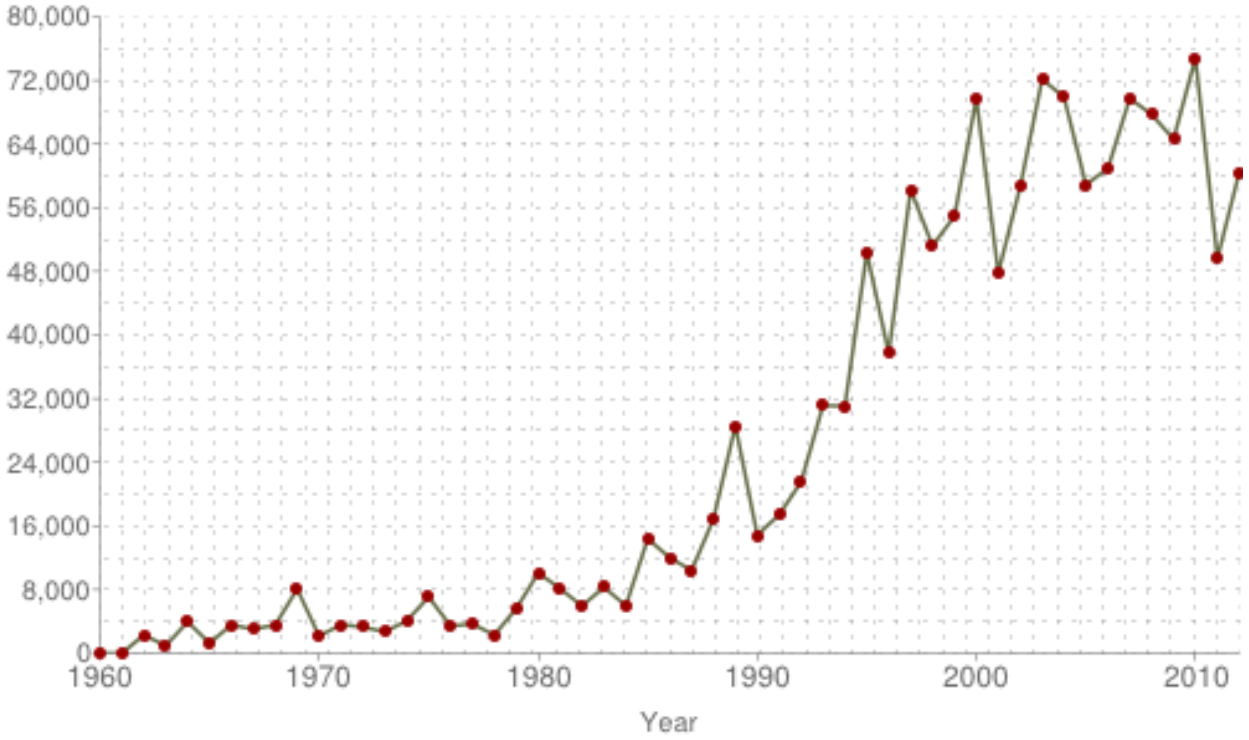


Figure 2. Total Number of Geese Harvested in Indiana 1960-2012 (USFWS)

*Mourning Doves*

In the 2014 ***Migratory Bird Hunting Activity and Harvest During the 2012 and 2013 Hunting Seasons*** report, the Service estimates the seasonal mourning dove harvest in Indiana to be 263,300 (2012) and 160,100 (2013). Doves harvested per hunter day afield in Indiana was 6.47 (2012) and 6.56 (2013). In the 2014 RAPP the Refuge had an estimated 50 migratory bird hunt visits for the year (an estimated 40 of these were for doves).

Using an average of 6.5 doves per day afield from the 2012 and 2013 seasons, opening 291 acres to hunting as proposed in the 2014 Hunt Plan will result in an estimated 1.6 additional dove hunt use days and an additional harvest of 10 doves, or 0.006% of the total harvest for the state in the 2013 season.

Forty-two dove hunt days on the 7,401 acres under Refuge management (with the new acquisitions) in a given year, would lead to an estimated harvest of 272 doves or 1.6% of the total harvest in Indiana in 2013.

*Woodcock, Snipe, Sora, and Coot*

Although these species are all heard and seen on the Refuge, very few hunters attempt to harvest these species. The Refuge estimates 10 hunt visits per year total for woodcock, snipe, and sora, with an estimated total of 2 woodcock (0.2% of the state harvest total from 2012 and 2013), 3 snipe (0.1% of state harvest total from 2012 and 2013), and 3 sora (0.1% of the state harvest total for rails in 2012 and 2013) taken on the Refuge per year.

Opening 291 acres to hunting as proposed in the 2014 Hunt Plan will result in a minimal harvest increase of 3/10 of one bird or less for woodcock, snipe, and sora, which amounts to less than one-percent of the harvested total for the state for each species. Ultimately, it is expected that well less than 0.5% of the state total harvest would occur on the 7,401 acres on the Refuge (includes recent acquisitions).

For coot, it is estimated that two percent (or 31 visits) of the 1,540 waterfowl visits per year are for coot hunting. In the Migratory Bird Hunting Activity and Harvest During the 2012 and 2013 Hunting Seasons report, the Service estimates the seasonal coot harvest to be 1.47 coots harvested per day afield, indicating the harvest on the Refuge is 46 coots per year, or 1.8% of the total harvest for the state.

Opening 291 acres to hunting as proposed in the 2014 Hunt Plan for coot would result in an estimated 1.2 additional hunt days and 2 additional coot harvested, or 0.04% of the state harvest total for 2013. For the 7,421 acres (including the new acquisitions) an estimated 32.5 hunt days would result in 48 coot taken on the Refuge, or 1.0% of the total state harvest in 2013.

### 4.2.5.B Anticipated Direct and Indirect Impact on Refuge Programs, Facilities, and Cultural Resources

Other Refuge Wildlife-Dependent Recreation

According to the 2014 RAPP Report, approximately 24,500 visitors used the Refuge units in 2014. Many of these visits were for hunting (9.900 visits). Non-consumptive visits totaled approximately 9,800.

Under this alternative, the public would have the opportunity to participate in hunting lands described in the 2014 Hunt Plan, which is one of the priority public uses, and compatible with the purposes for which the Refuge was established. Hunting is also a way for the public to gain an increased awareness of Patoka River NWR and the National Wildlife Refuge System.

The majority of the fishing, wildlife observation, environmental education, and interpretation activities occur in the spring, summer and early fall. Due to this seasonality, conflicts with hunting are expected to be minimal. Varied public uses have taken place on the Refuge since 1996 and conflicts between hunters and non-hunters such as wildlife observation, environmental education and interpretation have been minimal.

Refuge Facilities

Few, if any, additional impacts to Refuge facilities (roads, parking lots, and trails) will occur with this alternative. Refuge facilities will receive an increase in use with the addition of consumptive visitors, but the impacts would be minimal. Any maintenance or improvement of existing roads and parking areas will cause minimal short term impacts to localized soils and may cause some temporary wildlife disturbance.

Physical developments to accommodate the public's use and enjoyment of these Refuge lands will generally be limited to small parking areas, informational and educational signs, and access roads. On some units, short hiking trails and wildlife observation areas may be developed. Disturbance by vehicles will be limited to existing parking areas. Special access accommodations for persons with disabilities could be allowed. These accommodations will be made on a case by case basis by the Refuge manager.

Cultural Resources

This alternative will not have any additional impacts to cultural resources. Hunting activities will result in no ground disturbance or disturbance to standing structures and would have no effect on any historic properties.

**4.2.5.C Anticipated Direct and Indirect Impact on Refuge Environment and Community**

Refuge personnel expect no measurable adverse impacts by this proposed action on the Refuge environment which includes soils, vegetation, air quality, water quality and solitude. Some disturbance to surface soils and vegetation would occur in some areas, however these disturbances would be minimal.

The Service owns and administers numerous National Wildlife Refuges that are distributed throughout the country. All Refuge lands are part of the NWR System and the Service's primary purpose for these lands is to ensure the preservation of migratory birds, threatened and endangered species, and resident wildlife. An additional primary purpose established by the Service for these lands is to provide opportunities for the public to hunt, fish, observe and photograph wildlife, and increase public understanding and appreciation of the different ecosystems.

As a result of this alternative, expenditures by visitors for meals, lodging and transportation would increase in the communities where these Refuge lands are located. According to the 2011 National Survey of Fishing, Hunting, and Wildlife Associated Recreation, hunting and fishing expenditures in Indiana totaled $1.02 billion. Also in 2011, $752 million was spent on non-consumptive recreational activities in Indiana. Municipalities and community organizations could bring additional tourism revenues into their economies by establishing partnerships with the Service to develop and promote the recreational opportunities that are available on the Refuge lands surrounding their communities.

Impacts of the Proposed Action on the Refuge physical environment would have minimal to negligible effects to surface soils, topography, and vegetation that occur in areas opened to

hunting. Newly acquired acreage would be utilized more by the public (hunters) than had been previously and might cause increased trampling of vegetation, however the impacts should be minor. Refuge regulations do not permit the use of vehicles off of designated Refuge roads. Vehicles for hunters with disabilities would be confined to existing roads and parking lots.

Hunting would benefit vegetation as it is used to keep resident deer populations in balance with the carrying capacity of the habitat.

Impacts to the natural hydrology would be negligible. The Refuge staff expects impacts to air and water quality to be minimal and only due to Refuge visitor's use of automobiles on adjacent township and county public roads. The effect of these Refuge-related activities on overall air and water quality in the region are anticipated to be negligible.

Impacts associated with solitude are expected to be minimal given the limited time, season, and space management techniques used to avoid conflicts among user groups.

Public hunting on the Refuge should not adversely impact the soils, vegetation, air and water quality, solitude, or the Service's management activities for the Refuge lands. The establishment of a hunting program for the Refuge could positively impact the local economy by drawing visitors to the area who would likely spend money in the community.

There is a potential to have some minimal disturbance on the general public, nearby residents, and Refuge visitors. The disturbance factor is considered minimal, as hunting has occurred on the Refuge since 1996, as well as thousands of acres of state properties and private property in southwest Indiana. It is possible that Refuge hunting will increase hunting opportunities on surrounding lands, by increasing the wildlife moving beyond the boundary of the individual Refuge units.

### 4.2.5.D Other Past, Present, Proposed, and Reasonably Foreseeable Hunts and Anticipated Impacts

Hunting has been allowed on Patoka River NWR & MA since the first Hunting and Fishing Plan was approved and registered in the Code of Federal Regulations in 1996. If public use levels expand in the future, unanticipated conflicts between user groups may occur. Service experience has proven that time and space zoning can be an effective tool in eliminating conflicts between user groups. On a case by case basis, the Refuge Manager will determine if such a tool is necessary to limit conflicts.

### 4.2.5.E Anticipated Impacts If Individual Hunts are Allowed to Accumulate

National Wildlife Refuges, including Patoka River NWR & MA, conduct or will conduct hunting programs within the framework of State and Federal regulations. The Preferred Alternative is at least as restrictive as the State of Indiana and in some cases, the hunts will be more restrictive. By maintaining hunting regulations that are as, or more, restrictive than the State, individual Refuges ensure that they are maintaining seasons which are supportive of management on a regional basis.

The final EIS was reviewed by and the selected alternative supported by the Indiana Department of Natural Resources (INDNR) stated that hunting would be permitted on most fee title units of the Refuge. Additionally, the Refuge coordinates with the INDNR annually to maintain regulations and programs that are consistent with the States' management program.
The hunting of big game, upland/small game, and migratory bird game species will have minimal impacts to local, regional, state, and flyway populations. The majority of these lands were open to hunting before being acquired by the Service. Refuge personnel expect there will be a slight increase in the number animals harvested on Refuge lands as when these lands were in private ownership.

### 4.2.6 Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations" was signed by President Bill Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities access to public information and participation in matters relating to human health or the environment. This assessment has not identified any adverse or beneficial effects for either alternative unique to minority or low-income populations in the affected area.

## SECTION 4.3 Alternative C: Allow the hunting of migratory game birds, upland game, and big game species on recently acquired fee title lands (291 acres) in accordance with federal regulations, Refuge-specific regulations, and the laws of the State of Indiana; while the Columbia Mine Conservation Easement (1,043 acres) would remain closed to hunting. Public use on 7,110 acres acquired prior to 2013-2014 will remain unchanged.

This alternative would allow hunting on recently acquired fee title properties only as described in the 2014 Hunt Plan in accordance with the federal regulations, Refuge-specific regulations, and the laws of the State of Indiana, while the Columbia Mine would be closed to hunting. All 7,110 Refuge acres currently open to hunting would remain unchanged.

The Columbia Mine Conservation Easement would not be open to hunting, but continue to serve as habitat for wildlife and provide for five of the compatible wildlife dependent public uses – fishing, wildlife observation, photography, environmental education, and interpretation.

In total 7,401 acres would be open to hunting.

*Because there is only a slight difference between this alternative and the preferred alternative (in comparison, the only difference is opening the 1,043 acre Columbia Mine to limited deer, wild*

*turkey, and waterfowl hunting) the Environmental Consequences of this alternative are nearly the same as Alternative B.*

### 4.3.1 Habitat Impacts

Hunting access, in most cases, will be by foot access only. Parking will be restricted to designated parking lots. Impacts on vegetation should be temporary and similar to that occurring from non-consumptive users. Hunters with disabilities will be accommodated on a case by case basis.

### 4.3.2 Biological Impacts

Given the nature of these lands, disturbance of migratory birds, upland and small and big game, and resident wildlife will be the same as occurs on the surrounding state Fish and Wildlife Management Areas (FWA).

The harvest of Refuge wildlife species will be in accordance with Refuge-specific regulations, Federal regulations, and Indiana state limits. Other wildlife not being harvested will be disturbed by hunters approaching an animal's site, and flushing or moving the wildlife as the animals try to avoid human contact. This disturbance will be similar to the disturbance non hunted animals experience on state FWAs and will be minimal and temporary in nature.

### 4.3.3 Listed Species

No effect is expected for any federally listed threatened or endangered species or their critical habitat. A consultation pursuant to Section 7 of the Endangered Species Act was conducted as part of this EA and the updated Hunt Plan. A finding of "No Effects' was determined. No impacts are anticipated for state listed species.

### 4.3.4 Historic Properties and Cultural Resources

There are no historical properties documented on current Refuge lands.

### 4.3.5 Cumulative Impact Analysis of the Proposed Action

### 4.3.5.A Anticipated Direct and Indirect Impact of Proposed Hunting on Wildlife Species

The Service has allowed and administered a public hunting program on the Refuge since the 1996. Recent estimates show that the Refuge received approximately 9,900 hunting visits in 2014. During its history, the Service has not noted any significant adverse effects of these programs on the administration of the Refuge, and has determined that this use is compatible with the purposes of the Refuge and the NWR System's mission statement.

Hunting accounts for about 40% of the visits to the Refuge per year. The allowance of hunting on newly acquired Refuge lands will expose the largest user group to the Refuge habitats and facilitate a better appreciation and understanding of the local ecosystem. Also the allowance of public hunting will nurture a cooperative relationship with adjacent landowners by minimizing crop depredation. The majority of lands that will become Service owned tracts of Refuge are in private ownership when purchased by the Service. In Indiana, the majority of private rural lands are hunted on during at least some of the state seasons. Any impacts that hunting is having on the

land and its wildlife populations are already occurring and the change in ownership to the Service, and the subsequent hunting, will have little to no impact on wildlife populations.

In some cases, once owned by the Service, the hunting on these lands will be more restrictive than the current situation due to the Refuge's regulations being more restrictive than the state seasons.

**Non-hunted Resident Wildlife:**

Non-hunted wildlife would include small mammals such as voles, moles, mice, and shrews; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory butterflies and moths, these species have very limited home ranges and hunting would not affect their populations regionally.

Some species of butterflies and moths are migratory. Cumulative effects to these species at the "flyway" level should be negligible. Any hunter interaction would be similar to that of non-consumptive users. Disturbance to non-hunted wildlife would increase slightly. However, significant disturbance would be unlikely since small mammals are generally inactive during late November and December and many of these species are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to nonhunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

*White-tailed Deer*

In the 2013 Deer Season Summary, the Indiana Department of Natural Resources (INDNR) reported deer harvest numbers from 1951 to 2013. The number of deer harvested in the state was below 20,000 until the early 1980's. Since then, the number of deer harvested has risen tremendously to a level where over 100,000 deer have been taken each year since 1992. Since 2004, hunters have harvested at least 120,000 deer each year. The report indicates that the 125,635 deer harvested in 2013 was 8% less than the 136,248 deer harvested in 2012.

Within Pike (1,419 deer harvested) and Gibson (1,475 deer harvested) counties, where the Refuge is located, harvest numbers were about average for any Indiana county in 2013.

According to the Hunter/Harvest Report from Sugar Ridge Fish and Wildlife Area, an 8,100 acre property managed by the INDNR for hunting opportunities and adjacent to the Refuge, 46 deer were taken in 2013-2014. Nearly 4 deer were taken per square mile at Sugar Ridge in 2013.

The Refuge does not perform any management practices specifically for white-tailed deer, although they may benefit from some of the habitat management practices and habitat restoration efforts undertaken on the Refuge for other species. In addition, much of the Refuge can be flooded during parts of the state deer season, thereby taking away potential deer habitat for parts of the year.

Opening 291 acres to hunting as proposed in Alternative C will result in an estimated additional 2 deer harvested on newly opened Refuge lands per year, which equates to 0.001% of the total harvest for the state in 2013.

Opening 291 acres to hunting (Columbia Mine will remain closed) brings the Refuge-owned huntable land to a total of 7,401 acres (or approximately 11.5 square miles). Using the 4 deer/square mile harvested on Sugar Ridge FWA as an estimate, a maximum total of around 46 deer could be taken on the Refuge per year. Forty-six deer would represent 0.04% of the 125,635 deer harvested in Indiana in 2013.

*Wild Turkey*

The Refuge does not perform any management practices specifically for wild turkey, although they may benefit from some of the habitat management practices and habitat restoration efforts undertaken on the Refuge for other species. In addition, much of the Refuge can be flooded during parts of the state hunting season, thereby taking away potential wild turkey habitat for parts of the year.

According to the 2013-2014 Spring and Fall Wild Turkey Harvest Results from the INDNR Division of Fish and Wildlife 11,989 wild turkeys were harvested in Indiana by hunters in 2013-2014. 161 wild turkeys (1.3% of the total harvest for IN) were harvested in Gibson County, while Pike County accounted for 238 harvested birds (2.0% of the total harvest for IN).

At adjacent Sugar Ridge FWA 14 wild turkeys were harvested in 2013-2014, over the 8,100 acre management area, or 1.1 wild turkeys harvested per square mile.

Opening 291 acres to hunting as proposed in Alternative C will result in an estimated additional 0.5 wild turkey harvested on newly opened Refuge lands per year, which equates to 0.004% of the total harvest for the state in 2013.

Opening 291 acres to hunting (Columbia Mine will remain closed) brings the Refuge-owned huntable land to a total of 7,401 acres (or approximately 11.5 square miles). Using the 1.1 turkey/square mile harvested on Sugar Ridge FWA as an estimate, a maximum total of around 13 wild tukey could be taken on the Refuge per year. Thirteen wild turkey would represent 0.10% of the 11,989 wild turkeys harvested in Indiana in 2013.

*Bobwhite Quail*

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife 15,080 hunters harvested an estimated 19,866 bobwhites in Indiana during the 2010-2011 season, down 5.9 % from the 2008 survey.

The Refuge currently provides approximately 1,000 acres of suitable quail habitat, most in scattered, small fragments. Within the 22,472 acre acquisition boundary exists perhaps another 1,000 acres of suitable habitat that could be added to the Refuge over time. Presently, the Refuge gets very few hunters pursuing quail on the small grassland areas. Some of the best quail habitat in Southwest Indiana is on reclaimed coal mined grasslands. Over time, as much of the local reclaimed coal mine ground is reverted to cropland or leased to private hunting parties, the Refuge could see an increased interest in quail hunting use.

In 2014 it was estimated that of 1750 upland game visits to the Refuge, that 48 were for quail hunting. Using the average success rate of 0.36 birds harvested per day in the field as calculated by INDNR, it is estimated that 17 quail are harvested on the 7,110 acres under Refuge management in a given year, or 0.08% of the total harvest in Indiana.

Opening 291 acres to hunting (Columbia Mine will remain closed) as proposed in Alternative C will result in an estimated additional 2 quail hunts per year on newly opened Refuge land. Using the success rate of 0.36 birds harvested per day in the field as calculated by INDNR, it is estimated that .71 additional birds will be harvested on newly opened Refuge lands, which accounts for 0.004% of the total overall harvest in Indiana. Additionally, it is estimated that 18 quail could be harvested on the 7,401 acres under Refuge management (with the new acquisitions) in a given year, or 0.01% of the total harvest in Indiana.

*Cottontail Rabbit*

According to the most recent publication of the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife an estimated 80,894 cottontail hunters harvested an estimated 248,985 rabbits in Indiana during the 2010–2011 season.. Hunters in southwest Indiana had the greatest success averaging 0.75 cottontails harvested per day of hunting effort.

The Refuge currently provides approximately 1,000 acres of suitable rabbit habitat, most in scattered, small fragments. Within the 22,472 acre acquisition boundary exists perhaps another 1,000 acres of suitable habitat that could be added to the Refuge over time. In addition to managed grassland/shrublands, Refuge tree plantings provide temporary habitat for rabbits during the first few years after planting. To date the Refuge has planted trees on over 1,000 acres of agricultural fields with the ultimate goal of restoring hardwood forests.

In 2014 it was estimated that of the 1800 upland game visits to the Refuge, that 389 visits were for rabbit hunting. Using the success rate of 0.75 rabbits per day per hunter as described by INDNR, it is estimated that opening 291 acres to hunting (Columbia Mine will remain closed) as proposed in Alternative C will result in an additional 16 rabbit hunt visits per year, and an additional harvest of 12 rabbits or 0.005% of the total harvest for the state. Four-hundred and

five rabbit hunts could lead to an estimated harvest of 304 rabbits on the 7,401 acres under Refuge management (with the new acquisitions) in a given year, or 0.12% of the total harvest in Indiana.

*Squirrel (Gray and Fox)*

*Gray Squirrel*

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife an estimated 62,699 gray squirrel hunters harvested an estimated 212,033 gray squirrels in Indiana during the 2010-2011season.

The Refuge currently approximately 2,500 acres of mature large stands of hardwoods mostly in the eastern portion of the Refuge in Pike County that would provide ample habitat for the gray squirrel.

In 2014 it was estimated that of 1,750 upland game visits to the Refuge, that 97 were for gray squirrel hunting. Using the success rate of 0.51 gray squirrel per day per hunter as described by INDNR, opening 291 acres to hunting (Columbia Mine will remain closed) as proposed in Alternative C will result in an estimated additional 4 gray squirrel hunt visits per year, and an additional harvest of 2 gray squirrel or 0.0009% of the total harvest for the state in the 2010-2011 season. One-hundred and one gray squirrel hunts could lead to an estimated harvest of 52 gray squirrels on the 7,401 acres under Refuge management (with the new acquisitions) in a given year, or 0.02% of the total harvest in Indiana.

*Fox Squirrel*

According to the Small Game Harvest Survey conducted by INDNR Division of Fish and Wildlife an estimated 84,295 fox squirrel hunters harvested an estimated 375,117 fox squirrels in Indiana during the 2010-2011 season.

The Refuge currently provides a approximately 2,500 acres of fragmented forests interspersed with agricultural fields (both privately and Refuge owned) stands of hardwoods mostly in the western portion of the Refuge in Gibson County that provide suitable habitat for the fox squirrel.

In 2014 it was estimated that of 1750 upland game visits to the Refuge, that 486 were for fox squirrel hunting. Using the average success rate of 0.67 fox squirrel per day per hunter as described by INDNR, opening 291 acres to hunting (Columbia Mine will remain closed) as proposed in Alternative C will result in an estimated additional 20 fox squirrel hunt visits per year, and an additional harvest of 13 fox squirrel or 0.003% of the total harvest for the state in the 2010-2011 season. Five-hundred and six fox squirrel hunts could lead to an estimated harvest of 339 fox squirrels on the 7,401 acres under Refuge management (with the new acquisitions) in a given year, or 0.09% of the total harvest in Indiana.

*Raccoon, Fox (Red and Gray), Coyote, and Opossum*

INDNR Division of Fish and Game show stable, huntable populations of these furbearers. This alternative would only allow the hunting of these species on the 7,110 acres of Refuge land acquired prior to 2013-2014. The hunting of these species is dependent on the price of pelts in any given year. Weather also plays a part in harvest. DNR estimates for harvest by hunters for the 2010-2011 seasons are shown on Table 2.

Table 2. 2010-2011 State Harvest Estimate for Hunting

| **Species** | **Indiana Harvest** |
|---|---|
| Raccoon | 117,265 |
| Fox (Red and Gray) | 4,189 (red) 1,216 (gray) |
| Coyote | 42,762 |
| Opossum | 9,060 |

Hunting regulations for these species on Patoka River NWR & MA units require a Refuge permit. Available habitat on Refuge units will limit harvest.

In 2013, 15 permits were given out for hunting furbearers on the 7,110 acres under Refuge management. One permit can cover a hunter for multiple species of furbearers. Of these 19 permits, 12 included coyote, 12 included raccoon, 11 included fox, and 9 included opossum. The results of the 2013 harvest reports from hunters indicated the following furbearers were taken on the Refuge: 0 raccoon, 0 fox, 0 coyote, and 0 opossum.

Opening 291 acres to hunting (Columbia Mine will remain closed) as proposed in Alternative C will result in an estimated additional 0.6 Refuge permits given for hunting furbearers. No furbearers were harvested on the Refuge in 2013, and the harvest with the addition of less than one permitee is expected to be minimal.

**Non-hunted Resident Wildlife**

Non-hunted wildlife would include small mammals such as voles, moles, mice, and shrews; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory butterflies and moths, these species have very limited home ranges and hunting would not affect their populations regionally.

Some species of butterflies and moths are migratory. Cumulative effects to these species at the "flyway" level should be negligible. Any hunter interaction would be similar to that of non-consumptive users. Disturbance to non-hunted wildlife would increase slightly. However, significant disturbance would be unlikely since small mammals are generally inactive during late November and early December and many of these species are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood

reptiles and amphibians also limits their activity when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to nonhunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

**Migratory Birds**

Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for the protection and management of these birds. Under the Migratory Bird Treaty Act (16 U.S.C.703-712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any ... bird, or any part, nest, or egg" of migratory game birds can take place, and to adopt regulations for this purpose. These regulations are written after giving due regard to "the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, and are updated annually" (16 U.S.C. 704(a)). This responsibility has been delegated to the U.S. Fish and Wildlife Service as the lead federal agency for managing and conserving migratory birds in the United States. Acknowledging regional differences in hunting conditions, the Service has administratively divided the nation into four Flyways for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member from each State and Province in that Flyway. Patoka River NWR & MA is located in the Mississippi Flyway.

The process for adopting migratory game bird hunting regulations, located in 50 CFR part 20, is constrained by three primary factors. Legal and administrative considerations dictate how long the rule making process will last. Most importantly, however, the biological cycle of migratory game birds controls the timing of data-gathering activities and thus the dates on which these results are available for consideration and deliberation. The process of adopting migratory game bird hunting regulations includes two separate regulations-development schedules based on "early" and "late" hunting season regulations. Early hunting seasons pertain to all migratory game bird species in Alaska, Hawaii, Puerto Rico, and the Virgin Islands; migratory game birds other than waterfowl (e.g. dove, woodcock, etc.); and special early waterfowl seasons, such as teal or resident Canada geese. Early hunting seasons generally begin prior to October 1. Late hunting seasons generally start on or after October 1 and include most waterfowl seasons not already established. There are basically no differences in the processes for establishing either early or late hunting seasons. For each cycle, Service biologists and others gather, analyze, and interpret biological survey data and provide this information to all those involved in the process through a series of published status reports and presentations to Flyway Councils and other interested parties.

Because the Service is required to take an abundance of migratory birds and other factors in to consideration, the Service undertakes a number of surveys throughout the year in conjunction

with the Canadian Wildlife Service, State and Provincial wildlife-management agencies, and others. To determine the appropriate framework for each species, the Service considers factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort of State and Federal Governments. After Service establishment of final frameworks for hunting seasons, the States may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal frameworks but never more liberal. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a National Wildlife Refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows. The waterfowl season on Patoka River NWR & MA units will follow the frameworks set in place for Indiana.

*Waterfowl*

Waterfowl surveys are conducted during the late fall, winter, and early spring seasons. The data are used to provide managers and the public with current information on the distribution and abundance of waterfowl using the Refuge, and to identify annual trends in waterfowl use of wetlands and impoundments on the Refuge.

During the fall, winter, and spring, the Refuge wetlands support thousands of waterfowl, including Swans, Snow Geese, Canada Geese, Wood Ducks, Northern Pintail, Ring-necked Ducks, Mallards, Gadwall, American Wigeon, Northern Shoveler, Blue-winged Teal, and Green-winged Teal that use the Refuge as a stopover for rest and forage. Waterfowl that use the Refuge for nesting include Canada Goose, Mallard, Wood Duck, and Hooded Merganser.

The peak time for waterfowl use on the Refuge is January through mid-February (see Table 3). Aerial waterfowl surveys conducted in 2011, 2012, and 2014 indicated that over 17,000 ducks and geese may be using the Refuge along the Patoka River during this peak season. Over 200,000 ducks, geese, and swans have been documented in the area on February 8$^{th}$, 2011 at Gibson Lake (Duke Energy), Tern Bar Slough (INDNR), and Cane Ridge (Refuge) (see Table 4). Currently, INDNR has set the South Zone seasons for ducks at November 1$^{st}$ through 9$^{th}$ and November 29$^{th}$ through January 18$^{th}$ and geese at November 11$^{th}$ through 10$^{th}$ and November 29$^{th}$ through January 31$^{th}$. These dates provide hunting opportunities on the Refuge when waterfowl use is near its height.

Table 3. Aerial Waterfowl Inventory Data for Patoka River NWR & MA 2011, 2012, and 2014. Aerial survey below includes the western section of the Patoka River from HWY 41 to HWY 57.

| 2011 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1/14/2011 | | 2/8/2011 | 2/15/2011 | 2/23/2011 | | | | |
| Total Ducks | 3,150 | | 7,300 | 1,350 | 1,860 | | | | |
| Total Geese | 925 | | 4,350 | 1,790 | 425 | | | | |
| Total Ducks/Geese | 4,075 | | 11,650 | 3,140 | 2,285 | | | | |
| **2012** | | | | | | | | | |
| | 1/18/2012 | | 2/3/2012 | 2/17/2012 | 2/22/2012 | 2/28/2012 | 3/5/2012 | 3/16/2012 | 3/28/2012 |
| Total Ducks | 9,630 | | 15,900 | 16,040 | 13,435 | 12,720 | 6,690 | 8,440 | 2,160 |
| Total Geese | 855 | | 1200 | 855 | 480 | 115 | 75 | 20 | 15 |
| Total Ducks/Geese | 10,485 | | 17,100 | 16,895 | 13,915 | 12,835 | 6,765 | 8,460 | 2,175 |
| | | | | | | | | | |
| **2013** | 1/14/2014 | 1/22/2014 | 1/28/2014 | 2/11/2014 | 2/18/2014 | | | | |
| Total Ducks | 3,250 | 1900 | 10 | 4037 | 210 | | | | |
| Total Geese | 6,710 | 1226 | 900 | 170 | 1600 | | | | |
| Total Ducks/Geese | 9,960 | 3,126 | 910 | 4,207 | 1,810 | | | | |

Table 4. Aerial Waterfowl Inventory Data for Patoka River NWR & MA 2011, 2012, and 2014. Aerial survey below includes Gibson Lake (Duke Energy), Tern Bar Slough (INDNR), and Cane Ridge Fish and Wildlife Area (FWS, managed by the Refuge).

| 2011 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1/14/2011 | 2/8/2011 | 2/15/2011 | 2/23/2011 | 3/1/2012 | 3/6/2011 | 3/16/2011 | 3/24/2011 | 4/12/2011 |
| Total Ducks | 56,600 | 63,000 | 215 | 495 | 320 | 1,610 | 150 | 1,825 | 150 |
| Total Geese | 57,160 | 148,800 | 6,380 | 50 | 40 | 110 | 10 | 15 | 0 |
| Total Ducks/Geese | 113,760 | 211,800 | 6,595 | 545 | 360 | 1,720 | 160 | 1,840 | 150 |
| **2012** | | | | | | | | | |
| | 1/18/2012 | 1/24/2012 | 2/3/2012 | 2/17/2012 | 2/22/2012 | 2/28/2012 | 3/5/2012 | 3/16/2012 | 3/28/2012 |
| Total Ducks | 22,900 | 7,855 | 3,200 | 7,155 | 3,205 | 1,965 | 2,090 | 8,440 | 1,245 |
| Total Geese | 132,050 | 91,230 | 1,210 | 86,340 | 30,205 | 12,070 | 15,330 | 20 | 50 |
| Total Ducks/Geese | 154,950 | 99,085 | 4,410 | 93,495 | 33,410 | 14,035 | 17,420 | 8,460 | 1,295 |
| **2014** | | | | | | | | | |
| | 1/14/2014 | 1/22/2014 | 1/28/2014 | 2/11/2014 | 2/15/2014 | 2/18/2014 | | | |
| Total Ducks | 671 | 2,880 | 5,570 | 4,232 | 6,300 | 1,965 | | | |
| Total Geese | 49,510 | 2,200 | 76,730 | 74,825 | 85,720 | 50,900 | | | |
| Total Ducks/Geese | 50,181 | 5,080 | 82,300 | 79,057 | 92,020 | 52,865 | | | |

In the 2014 ***Migratory Bird Hunting Activity and Harvest During the 2012 and 2013 Hunting Seasons*** report, the Service estimates the seasonal duck harvest in Indiana to be 131,600 (2012)

and 100,400 (2013) (see Figure 1). Ducks harvested per hunter day afield in Indiana was 1.37 (2012) and 1.41 (2013).

There are 76 days of duck hunting in SW Indiana for 2014 (early Teal season 9/6-9/21, regular duck season South Zone 11/1-11/9, 11/29-1/18). An estimated 40 duck hunters use the Refuge each day on the weekend (26 days), while an estimated 10 duck hunters use the Refuge each day during the week (50 days) for a total of 1,540 duck hunt users. Using an average of 1.39 ducks per day afield from the 2012-2013 seasons multiplied by 65 duck hunt visits to the Refuge indicates an additional harvest of 90 ducks, or 0.08% of the total harvest for the state may be harvested on the Refuge in a given year.

Opening 291 acres (Columbia Mine will remain closed) to hunting as proposed in Alternative C will result in an estimated 63 additional hunt use days. Using an average of 1.39 ducks per day afield from the 2012-2013 seasons multiplied by 63 duck hunt visits to the Refuge indicates an additional harvest of 88 ducks, or 0.08% of the total harvest for the state may be harvested on newly opened Refuge lands in a given year.

One-thousand six-hundred and three duck hunt days on the 7,401 acres under Refuge management in a given year, would lead to an estimated harvest of 2,228 ducks or 2.2% of the total harvest in Indiana in 2013.

In the 2014 ***Migratory Bird Hunting Activity and Harvest During the 2012 and 2013 Hunting Seasons*** report, the Service estimates the seasonal goose harvest in Indiana to be 60,400 (2012) and 54,900 (2013) (see Figure 2). Geese harvested per hunter day afield in Indiana was .88 (2012) and .81 (2013).

When compared to duck hunting, it is estimated that about ten percent of the waterfowl visits are specifically for geese. Currently, the Refuge has approximately 154 goose hunt visits per year. Using an average of .85 geese averaged per day afield from the 2012-2013 seasons multiplied by 154 goose hunt visits to the Refuge indicates that 130 geese (or 0.2% of the total harvest for the state) may be harvested on the Refuge in a given year.

Opening 291 acres to hunting as proposed in the 2014 Hunt Plan will result in an estimated 6 additional hunt use days. Using an average of .85 geese per day afield from the 2012-2013 seasons multiplied by 6 goose hunt visits to the Refuge indicates an additional harvest of 5 geese, or 0.01% of the total harvest for the state may be harvested on newly opened Refuge lands in a given year.

One-hundred and sixty goose hunt days on the 7,401 acres under Refuge management in a given year, would lead to an estimated harvest of 136 geese or 0.25% of the total harvest in Indiana in 2013.

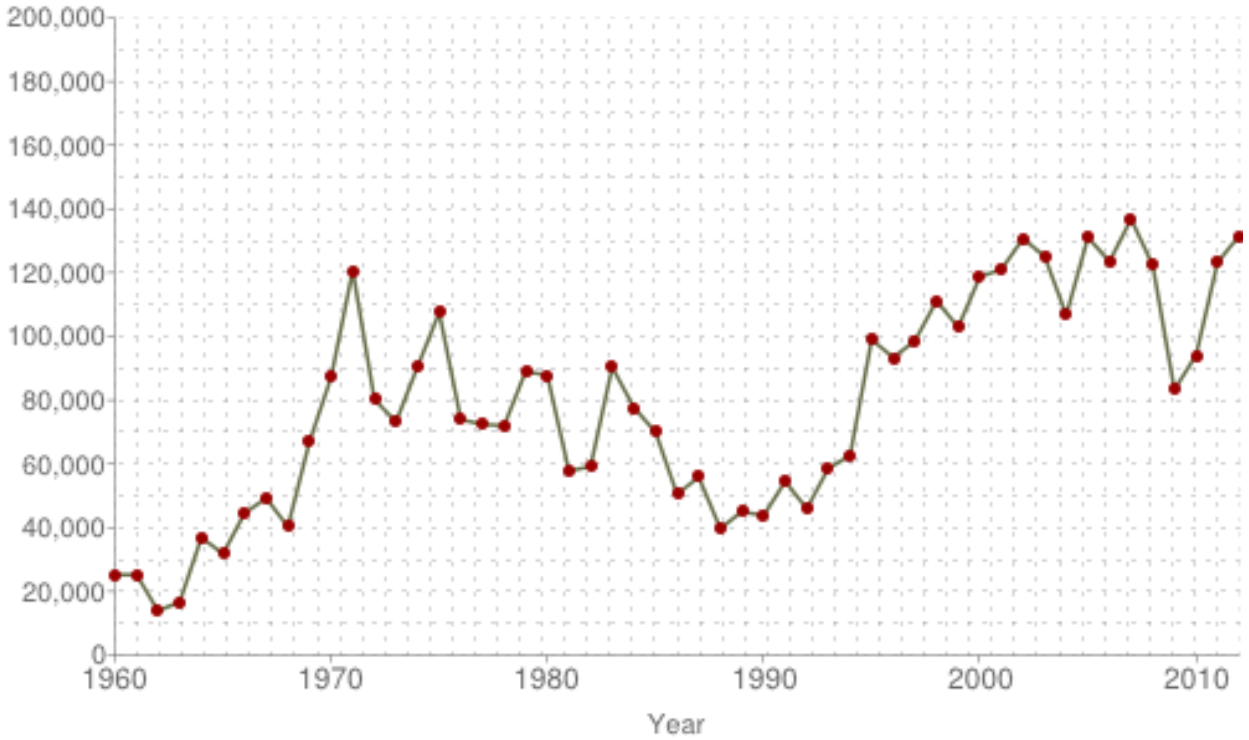


Figure 1. Total Number of Ducks Harvested in Indiana 1960-2012 (USFWS)

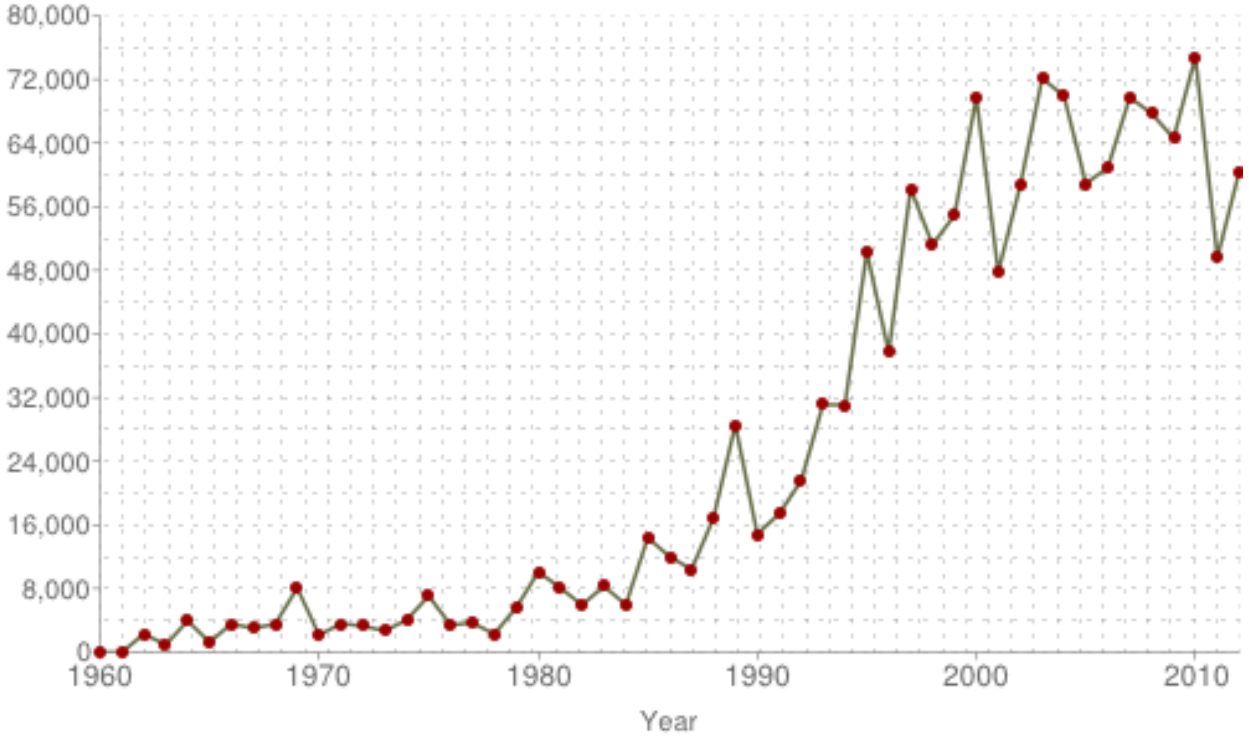


Figure 2. Total Number of Geese Harvested in Indiana 1960-2012 (USFWS)

*Mourning Doves*

In the 2014 ***Migratory Bird Hunting Activity and Harvest During the 2012 and 2013 Hunting Seasons*** report, the Service estimates the seasonal mourning dove harvest in Indiana to be 263,300 (2012) and 160,100 (2013). Doves harvested per hunter day afield in Indiana was 6.47 (2012) and 6.56 (2013). In the 2014 RAPP the Refuge had an estimated 50 migratory bird hunt visits for the year (an estimated 40 of these were for doves).

Using an average of 6.5 doves per day afield from the 2012 and 2013 seasons, opening 291 acres to hunting as proposed in Alternative C will result in an estimated 1.6 additional dove hunt use days and an additional harvest of 10 doves, or 0.006% of the total harvest for the state in the 2013 season.

Forty-two dove hunt days on the 7,401 acres under Refuge management (with the new acquisitions, Columbia Mine will remain closed) in a given year, would lead to an estimated harvest of 272 doves or 1.6% of the total harvest in Indiana in 2013.

*Woodcock, Snipe, Sora, and Coot*

Although these species are all heard and seen on the Refuge, very few hunters attempt to harvest these species. The Refuge estimates 10 hunt visits per year total for woodcock, snipe, and sora, with an estimated total of 2 woodcock (0.2% of the state harvest total from 2012 and 2013), 3 snipe (0.1% of state harvest total from 2012 and 2013), and 3 sora (0.1% of the state harvest total for rails in 2012 and 2013) taken on the Refuge per year.

Opening 291 acres to hunting as proposed in Alternative C will result in a minimal harvest increase of 3/10 of one bird or less for woodcock, snipe, and sora, which amounts to less than one-percent of the harvested total for the state for each species. Ultimately, it is expected that well less than 0.5% of the state total harvest would occur on the 7,401 acres on the Refuge (includes recent acquisitions).

For coot, it is estimated that two percent (or 31 visits) of the 1,540 waterfowl visits per year are for coot hunting. In the Migratory Bird Hunting Activity and Harvest During the 2012 and 2013 Hunting Seasons report, the Service estimates the seasonal coot harvest to be 1.47 coots harvested per day afield, indicating the harvest on the Refuge is 46 coots per year, or 1.8% of the total harvest for the state.

Opening 291 acres to hunting as proposed in Alternative C for coot would result in an estimated 1.2 additional hunt days and 2 additional coot harvested, or 0.04% of the state harvest total for 2013. For the 7,421 acres (including the new acquisitions) an estimated 32.5 hunt days would result in 48 coot taken on the Refuge, or 1.0% of the total state harvest in 2013.

### 4.3.5.B Anticipated Direct and Indirect Impact on Refuge Programs, Facilities, and Cultural Resources

Other Refuge Wildlife-Dependent Recreation

According to the 2014 RAPP Report, approximately 24,500 visitors used the Refuge units in 2014. Many of these visits were for hunting (9.900 visits). Non-consumptive visits totaled approximately 9,800. While not open to hunting, all units specified in the 2014 Hunt Plan would be open to other priority uses including fishing, nature observation, photography, education, and interpretation.

The majority of the fishing, wildlife observation, environmental education, and interpretation activities occur in the spring, summer and early fall. Due to this seasonality, conflicts with hunting are expected to be minimal.

Refuge Facilities

Few, if any, additional impacts to Refuge facilities (roads, parking lots, and trails) will occur with this alternative. Refuge facilities will receive an increase in use with the addition of consumptive visitors, but the impacts would be minimal. Any maintenance or improvement of existing roads and parking areas will cause minimal short term impacts to localized soils and may cause some temporary wildlife disturbance.

Physical developments to accommodate the public's use and enjoyment of these Refuge lands will generally be limited to small parking areas, informational and educational signs, and access roads. On some units, short hiking trails and wildlife observation areas may be developed. Disturbance by vehicles will be limited to existing parking areas. Special access accommodations for persons with disabilities could be allowed. These accommodations will be made on a case by case basis by the Refuge manager.

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Cultural Resources

This alternative will not have any additional impacts to cultural resources. Hunting activities will result in no ground disturbance or disturbance to standing structures and would have no effect on any historic properties.

### 4.3.5.C Anticipated Direct and Indirect Impact on Refuge Environment and Community

Refuge personnel expect no measurable adverse impacts by this proposed action on the Refuge environment which includes soils, vegetation, air quality, water quality and solitude. Some disturbance to surface soils and vegetation would occur in some areas, however these disturbances would be minimal.

The Service owns and administers numerous National Wildlife Refuges that are distributed throughout the country. All Refuge lands are part of the NWR System and the Service's primary purpose for these lands is to ensure the preservation of migratory birds, threatened and endangered species, and resident wildlife. An additional primary purpose established by the

Service for these lands is to provide opportunities for the public to hunt, fish, observe and photograph wildlife, and increase public understanding and appreciation of the different ecosystems.

As a result of this alternative, expenditures by visitors for meals, lodging and transportation would increase in the communities where these Refuge lands are located. According to the 2011 National Survey of Fishing, Hunting, and Wildlife Associated Recreation, hunting and fishing expenditures in Indiana totaled $1.02 billion. Also in 2011, $752 million was spent on non-consumptive recreational activities in Indiana. Municipalities and community organizations could bring additional tourism revenues into their economies by establishing partnerships with the Service to develop and promote the recreational opportunities that are available on the Refuge lands surrounding their communities.

Impacts of the Proposed Action on the Refuge physical environment would have minimal to negligible effects to surface soils, topography, and vegetation that occur in areas opened to hunting. Newly acquired acreage would be utilized more by the public (hunters) than had been previously and might cause increased trampling of vegetation, however the impacts should be minor. Refuge regulations do not permit the use of vehicles off of designated Refuge roads. Vehicles for hunters with disabilities would be confined to existing roads and parking lots.

Hunting would benefit vegetation as it is used to keep resident deer populations in balance with the carrying capacity of the habitat.

Impacts to the natural hydrology would be negligible. The Refuge staff expects impacts to air and water quality to be minimal and only due to Refuge visitor's use of automobiles on adjacent township and county public roads. The effect of these Refuge-related activities on overall air and water quality in the region are anticipated to be negligible.

Impacts associated with solitude are expected to be minimal given the limited time, season, and space management techniques used to avoid conflicts among user groups.

Public hunting on the Refuge should not adversely impact the soils, vegetation, air and water quality, solitude, or the Service's management activities for the Refuge lands. The establishment of a hunting program for the Refuge could positively impact the local economy by drawing visitors to the area who would likely spend money in the community.

There is a potential to have some minimal disturbance on the general public, nearby residents, and Refuge visitors. The disturbance factor is considered minimal, as hunting has occurred on the Refuge since 1996, as well as thousands of acres of state properties and private property in southwest Indiana. It is possible that Refuge hunting will increase hunting opportunities on surrounding lands, by increasing the wildlife moving beyond the boundary of the individual Refuge units.

**4.3.5.D Other Past, Present, Proposed, and Reasonably Foreseeable Hunts and Anticipated**

**Impacts**
Hunting was allowed on most of these lands when they were in private ownership before they became part of the Refuge, and therefore there would be no anticipated impacts from this alternative.

### 4.3.5.E Anticipated Impacts If Individual Hunts are Allowed to Accumulate

National Wildlife Refuges, including Patoka River NWR & MA, conduct or will conduct hunting programs within the framework of State and Federal regulations. This Alternative is at least as restrictive as the State of Indiana and in some cases, the hunts will be more restrictive. By maintaining hunting regulations that are as, or more, restrictive than the State, individual Refuges ensure that they are maintaining seasons which are supportive of management on a regional basis.

### 4.3.6 Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations" was signed by President Bill Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities access to public information and participation in matters relating to human health or the environment. This assessment has not identified any adverse or beneficial effects for either alternative unique to minority or low-income populations in the affected area.

This alternative will not disproportionately place any adverse environmental, economic, social, nor health impacts on minority or low income populations.

# CHAPTER 5. REGULATORY COMPLIANCE

The Refuge Recreation Act of 1962 (16 U.S.C 460k) authorizes the Secretary of the Interior to administer National Wildlife Refuges for public recreation as an appropriate incidental or secondary use (1) to the extent that is practicable and consistent with the primary objectives for which an area was established, and (2) provided that funds are available for the development, operation, and maintenance of permitted recreation. The National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 688dd-ee) authorizes the Secretary of the Interior to permit the use of any area within the NWR System for any purpose, including but not limited to hunting, fishing, and public recreation whenever those uses are determined to be compatible with the purposes for which the area was established. The Improvement Act of 1997 is the latest amendment to the NWR System Administration Act. It supports the NWR System Administration Act's language concerning the authorization of hunting and other recreational

uses on Refuge lands. The NWR Improvement Act substantiates the need for the NWR System to focus first and foremost on the conservation of fish, wildlife, and plant resources and their habitats and states that other uses will only be authorized if they are determined to be compatible with this mission statement and the purposes for which the Refuge was established.

Patoka River NWR & MA was established under the authority of the Emergency Wetlands Resources Act of 1986 and its purpose is to provide for the development, advancement, management, conservation, and protection of fish and wildlife resources. The 1994 Final EIS developed for the establishment of the Refuge identified providing compatible wildlife-dependent recreational public uses, such as hunting, fishing, wildlife observation and photography, environmental education and interpretation as being a primary goal for the Refuge. This EIS states that hunting will be permitted on most Units of the Refuge in accordance with federal regulations, refuge regulations, and state seasons. Additionally, hunting was identified in the 2008 Interim Comprehensive Conservation Plan (CCP) that was developed for the Refuge as being a priority public uses that would be authorized on most Units of the Refuge. The Service has determined (i.e., Compatibility Determination included with the 2008 CCP) that these uses are compatible with the purpose of the Refuge and the mission statement of the NWR System. Annual changes to the hunting program will be included in the Hunt Plan and updated in the Code of Federal Regulations.

# CHAPTER 6. CONSULTATION AND COORDINATION WITH OTHERS

The Indiana Department of Natural Resources Division of Fish and Wildlife was contacted and wrote a letter of concurrence regarding the 2014 Hunt Plan. The Fish and Wildlife Service also provided an in-depth review by the Regional Office personnel and staff biologists. Numerous contacts were made throughout the area of the refuge soliciting comments, views, and ideas into the development of the accompanying Hunt Plan.

# CHAPTER 7. PUBLIC COMMENT ON DRAFT EA AND RESPONSE

No responses or comments were received during the comment period.

# CHAPTER 8. REFERENECES

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